

not emphasized bond-formation and bond-cleavage processes with the usual arrows to the extent that they might have. On this latter point the authors might be faulted because an understanding of these electron transfer processes is essential to organic chemists of all types. The authors do include, however, an extensive and up to date list of references to the original literature on this and other aspects of the subject.

The book is well produced and, like its predecessors, it is very readable. It is primarily a source book and as such it can be highly recommended. The price now brings it within reach of the undergraduate pocket, and it is to be hoped that the book will attain the readership which it undoubtedly deserves. E. J. FORBES

PHYSICAL GROUPS

How to Use Groups

By J. W. Coech and D. J. Newman. (Methuen's Monographs on Physical Subjects.) Pp. 133. (Methuen: London, March 1969.) 32s cloth; 21s paper.

THIS is a very useful little book. As the title implies, the authors have tried to avoid presenting a series of theorems in abstract group theory, and have confined themselves to the basic ideas which one needs to apply symmetry methods to physical problems, on the sound view that the theorems do not mean very much to the scientist until he has some idea of what they lead to. The style is extremely terse, and in places is reminiscent of the lecture notes from which the book evolved; this occasionally leads to obscurities (as in the italicized note on pages 93-94, which is misleading as it stands) and to omissions (for example, nothing is said about ligand-field theory, although there is a whole chapter on crystal-field theory, which is a method which can only be justified in terms of ligand-field theory). But, on the whole, the book is very clear and, even more important, the mathematical formulae are reliable.

The main text occupies 105 pages, of which the last five contain a highly condensed summary of further applications. There are references throughout the book to more detailed treatments of particular topics, and a short general bibliography—both essential in a book of this nature. The appendices include the inevitable character tables, including those of double groups in a highly condensed form, a list of explicit formulae for spherical harmonics, and the proofs of the theorems of representation theory which are quoted in the body of the book. There are numerous exercises, with notes at the end of the book, and there is an adequate index.

A. J. STONE

ASTRONOMY IN THE ROUND

Spherical and Practical Astronomy as Applied to Geodesy

By Ivan I. Mueller. With a Contribution by Heinrich Eichor. Pp. xxx+615. (Ungar: New York, May 1969.) \$18.50.

THERE are many excellent textbooks on the subject of spherical and practical astronomy, but the most thorough (such as Chauvenet) are now out of date. Not only have logarithms been superseded by direct calculation, but the speed of electronic computers has made unnecessary the older formulations designed to reduce the amount of calculation; moreover, there have in recent years been significant changes in the concept of the time-scale defined by the rotation of the Earth. The application of astronomical observations to the

location of points on the surface of the Earth has been widely treated at the level of precision required for topographical survey; but the texts on geodesy cannot deal with the subject in fine detail. There is, therefore, a real need for a thorough and comprehensive treatment, and this book appears to supply this admirably.

Although the author, the professor of geodetic science at Ohio State University, modestly regards this as an introduction to the subject, much is sufficiently detailed to be used in practice. There can be, of course, little that is basically original at such a practical level, and the author has drawn widely from other published sources. He has, however, successfully brought together the relevant theoretical, instrumental and practical aspects of both spherical astronomy and geodesy in a form that should appeal both to astronomers interested in geodetic applications and to geodesists wishing to utilize astronomical methods. The main subject headings on which the author concentrates are: the Earth from the geodetic point of view; the celestial sphere and its coordinate systems, with a fairly detailed treatment of their variations; time systems and time dissemination, dealt with in a most practical manner; star catalogues, a chapter that should be of great value to those who might otherwise take the printed values as absolutely correct; astronomical instruments, treated both theoretically and with practical descriptions; chapters on the practical determination of azimuth, latitude, longitude and time; and finally a comprehensive treatment of the applications of solar eclipses and occultations in geodesy.

A welcome feature of the book is the inclusion of numerical illustrations of the calculations required in many of the reductions and determinations. It is copiously and well illustrated, and is provided with an adequate index and references to literature. Although reproduced from ordinary typescript with all its limitations (though with a justified right-hand margin), it is very clearly set out and printed. Great care has clearly been taken both in the compilation and the production, with a result that cannot but benefit the reader.

D. H. SADLER

EUROPEAN PHYSICS

The Big Machine

By Robert Jungk. Translated by Grace Marmor Spruch and Traude Wess. Pp. vii+245. (Deutsch: London, May 1969.) 30s.

I FOUND this a quite infuriating book. In the first place, it must be acknowledged that Dr Jungk often succeeds quite well in giving a very lively impression of a particular scientific situation; he succeeds, too, in making it clear that science is done by human beings; and he exposes well the strikingly international character of CERN in particular and high energy physics in general.

But the book—an account of the building and use of the 28 GeV proton synchrotron at CERN—has equally grave faults. The most serious of these is that Jungk seems to have not the faintest idea what high energy physics is all about, so any account he gives of the experiments done in a high energy physics laboratory is bound to read a little oddly. For example, a whole chapter—"The Search"—is devoted to describing a neutrino experiment done at CERN, without any serious attempt being made to explain the point of the experiment.

Although for the most part the book reads reasonably well, there are certain lapses into somewhat distressing journalese. It is a little difficult to say in this connexion who is more at fault, Jungk or his translators. He seems not to have been too well served by them, particularly when it comes to translating from one system of units to another. In one sentence, for example, we read that a particular circle "almost one-third mile around" has a