need for such books, possibly roughly produced, but cheap enough for research students and, because of the transient nature of much of the material, brought out quickly. This volume is exceptional in that it is well printed (in East Germany), but otherwise its year delay and its price mean that it is one more book aimed for library consumption.

The style of the contributions is very varied. In the mid-1960s the symmetry game advanced very fast; people speculated and were rewarded. Those days seem to have passed, and the contributions of the people who try to carry on the revolution are not in general very inspiring.

If there were not such strong prejudices against the basis of the Naive Quark Model, the mass of evidence in the review of Dalitz, complemented by that of Mitra, would make the theory universally acceptable. It would be convincing if somebody were to find quarks, but as Jones regretfully concludes, "I suspect that most experimentalists feel that physical quarks are either unobservable or do not exist". The discussion by Lipkin of the quark model as a guide to hadron dynamics is interesting, as are the various comparisons of symmetry predictions with experiment, for example, by Meshkov, Okubo and Overseth. There are also papers on current algebras, partially conserved axial vector current (PCAC), infinite multiplets, and the like.

There is a very thorough article by Yodh on the experimental situation concerning Ξ^* resonances which are predicted by the symmetry schemes. But one has the feeling that more up to date information could be obtained by looking up the latest publication of the Particle Data Group (free of charge). COLIN WILKIN

MAGNETS

Superconductivity and its Applications

By J. E. C. Williams. (Applied Physics Series.) Pp. 213. (Pion: London, 1970.) 60*s* boards; 46*s* paper.

THIS book divides into three parts, unequal in length and quality: first, sixty introductory pages; second, nearly one hundred pages on hard superconductors and their applications; and third, nearly forty pages of other applications.

The middle section is by far the best part. It begins with an introduction to the critical state model. There follows a very full discussion of magnets, including stabilization, considerable detail on materials and examples of specific magnets. Then comes a good chapter on a.c. power devices. The calculations for stabilization, carried out chiefly for the model geometry of a thin plate in a parallel field, are presented in detail. The whole middle section forms a complete and lucid introduction to magnet design, and should be of value to anybody moving into this field.

The introductory part is not so good. It is turgid in places, and it contains several erroneous statements which may not matter for this book, but which are irritating to see. For example, the decrease of the energy gap with temperature has nothing to do with the increase in the number of real phonons present. The vortex core radius is not equal to the free path in the dirty limit.

The miscellaneous applications (magnetometer, Josephson junctions, computer elements and some oddments) are dealt with satisfactorily, except that in my view the Josephson effect is too lightly dismissed. The measurement of e/h (voltage standard) is not even mentioned. The rather promising use of weak links as infrared detectors is not discussed either, although it finds a place in Kimmitt's companion volume on far infrared.

There is a good index, and a bibliography which is thorough for magnets. The paperback version costs nearly as much as the hardback. D. R. TILLEY

NEUTRON SCATTERING

Magnetic Neutron Diffraction

By Yurii A. Izyumov and Ruslan P. Ozerov. Translated from the Russian. Pp. xviii + 598. (Plenum: New York; Heydon: London, June 1970.) 350*s*; $37.50; 150 DM.

THE neutron possesses a magnetic moment and it therefore interacts with the magnetic field produced by unpaired electrons in an atom or ion. The study of the scattering of slow neutrons by magnetic substances is a rich source of information on their magnetic properties. These properties may be divided into two categories, static and dynamic. By the former is meant the magnetic structure or ordering, that is to say, the pattern made by the directions of the magnetic moments (or spins) of successive atoms in the crystal. Originally the only known patterns were the ferromagnetic, in which all the moments point in the same direction, and the antiferromagnetic, in which alternate moments point in opposite directions. Neutron diffraction, however, has elucidated not only these, but several others such as an "umbrella" type in which successive moments lie along the surface of a cone the axis of which remains constant.

Information on these static properties comes from a study of the elastic scattering of slow neutrons. Further valuable information on the dynamics of the moments comes from the inelastic scattering. Here the neutron is scattered by a process in which it causes excitations in the arrangements of the spins. The energy of the latter changes, and this manifests itself as a change in the kinetic energy of the neutron. The knowledge obtained is valuable not only for the magnetic properties themselves, but also for the light it sheds on critical phenomena in general—a poorly understood branch of physics.

This book by Izyumov and Ozerov is a translation of an original version published in Russia in 1966. The title is somewhat misleading in that the word diffraction is usually restricted to elastic scattering, whereas the book also discusses inelastic scattering. The authors discuss the magnetic structures of rare earth metals and their compounds, double metallic oxides, and magnetic alloys. There are chapters on the distribution of magnetic moments, spin dynamics, and the behaviour of ferromagnetic crystals containing impurity atoms. The theory of neutron scattering is developed from first principles, and in spite of the formal nature of much of the analysis, the arguments are presented very clearly. There is much emphasis on the symmetry concepts developed by Shubnikov and his school.

The book will be extremely useful to research workers—both experimental and theoretical—in the field of neutron scattering by magnetic materials, although the price will limit sales. G. L. SQUIRES

INORGANIC RINGS

The Chemistry of Inorganic Ring Systems

By Ionel Haiduc. Part 1: Pp. vi + 1–622. Part 2: Pp. 623–1197. (Wiley (Interscience): London and New York, August 1970.) 500*s* the set.

THE ring symbolizes power, authority, betrothal and marriage, eternity, and perfect form; "in my beginning is my end". Rings have been used in medicine (to ward off the cramp), and poison rings for murder or (as by Hannibal) for suicide. The serpent biting its own tail, an alchemical sign for the unity (or perfect form) of matter, and for circulatory processes, was the image that came to Kekulé when he thought of the ring structure for benzene.

Inorganic rings were made, unwittingly, by Liebig and Wöhler, and by Rose, in 1834 (*cyclo*phosphazenes), and by Gregory in 1835 (*cyclo*tetrathiazene, S_4N_4). But demon-