churning and thrashing from which the theory emerged gets confined to a few introductory pages. Original articles are often in now obscure journals. Thus this volume is an especially welcome addition to the admirable series of "Selected Readings in Physics".

"Special relativity is not, like other scientific theories, a statement about the matter that forms the physical world, but has the form of a condition that the explicit physical theories must satisfy. It is thus a form of description, playing to some extent the role of the grammar of physics. . . . So, to describe it, one needs also to describe those specific theories and to say how much they are limited by it." With this motivation, Professor Kilmister provides an excellent 85-page mathematical summary of the most important applications of the relativity principle to electromagnetism and quantum mechanics. This introduction also contains useful background material on variational principles and group theory.

Next follow reprints of ten basic papers, each with a helpful introductory note. Michelson (1881) describes his interferometer and shows there is no relative motion between Earth and the other. Larmor (1900) struggles to find a mechanical representation of the ether, hits upon a model fluid of little gyroscopes, and decides that the variational principle which it illustrates is more important. Lorenz (1904) investigates transformations of Maxwell's equations, but without realizing their fundamental origin. These transformations are deduced from a variational principle by Poincaré (1906) in "The Dynamics of the Electron". By contrast with these papers, the incisive nature of Einstein's (1905) contribution becomes even more striking. Two experimental papers, one by M. Wilson and H. A. Wilson (1913) "On the Electric Effect of Rotating a Magnetic Insulator in a Magnetic Field", and the other by Zeeman (1914) on "Fresnel's Coefficient for Light of Different Colours" (repeating Fizeau's experiment), confirm relativity. Dirac (1928) relates Lorentz invariance and electron spin in "The Quantum Theory of the Electron". Early confusion surrounding cloud chamber photographs of cosmic ray tracks is illustrated by Anderson's (1932) discovery of positrons which he thought were protons. The first one-third of Wigner's (1939) paper "On Unitary Representations of the Inhomogeneous Lorentz Group", and an index, end this nicely balanced collection. For a more personalized view of the development of relativity, Max Born's charming essay "Physics and Relativity" (available in his *Physics in my Generation*) provides a complementary epilogue.

WILLIAM C. SASLAW

PLASMAS IN SPACE

Introduction to the Physics of Space

By Bruno Rossi and Stanislaw Olbert. (International Series in Pure and Applied Physics.) Pp. xii+454. (McGraw-Hill: New York and Maidenhead, 1970.) 187*s*.

THIS new book contains a very careful and lucid account of plasma physics, with applications to space physics. Substantial applications are made to cosmic rays, trapped radiation and the solar wind. The chapters on cosmic rays fall into a natural place in the discussion of motion of charged particles in electromagnetic fields. They are followed by chapters on adiabatic invariants and the trapped radiation. The main body of plasma physics, followed by a chapter on the steady expansion of the solar corona, completes the work.

The simplest approach to plasma physics is to treat the plasma as collisionless. The fundamental equations can be obtained by combining the motions of individual particles. Alternatively, the subject can be approached by way of the distribution function. Both methods are rigorously developed in considerable detail in the book, although, as the distribution function method deals rigorously with collisions, the simple approach, reasonably, stops short there. It is worth calling attention to the chapters on binary collisions between charged particles, and between photons and electrons. The chapter on the Fokker–Planck approximation is also particularly well written. A feature of the book is that many of the calculations are relativistically correct. The notation makes it easy to distinguish relativistic and non-relativistic cases.

It is a pity that in such an excellent book the original authors of many new ideas in space physics are not mentioned, and that wave propagation is confined to one or two exercises for students. It could also be argued that a book on space physics should contain a more complete description of the magnetosphere. Perhaps these may be included in a later edition, because the book deserves to be a great success.

Many research workers in plasma and space physics will, however, wish that its price were lower: it is well worth owning a copy. The book will be found particularly useful for its formulae, which are rewritten in numerical terms, suitable for reference and general use.

P. C. KENDALL

A LITTLE KNOWN OCEAN

Scientific Exploration of the South Pacific

Edited by Warren S. Wooster. (Proceedings of a Symposium held during the Ninth General Meeting of the Scientific Committee on Oceanic Research, June 18–20, 1968, at the Scripps Institution of Oceanography, La Jolla, California.) Pp. vii+257. (National Academy of Sciences: Washington DC, August 1970.) $10.50.

THE symposium reported in this volume was meant to test scientific opinion on the potential value of international cooperation in the study of what now seems to be the least known ocean.

The papers in physical oceanography showed that the surface currents are well described by what we know of the wind systems and mechanics of boundary currents. The layering and origins of the deep water masses are known fairly well from observations made in the Antarctic, the equatorial region and the coastal areas, and the published conclusions are supported by the limited observations across the central area. Although there is still much to do, rapid advances are being made. A preview was given of the results of two joint Scripps, Woods Hole and MIT cruises which provide many observations of modern accuracy across the whole width of the ocean in 28° S and 43° S. They give clear evidence of a deep western boundary current, and provide material that can be used to investigate less outstanding features in the central part of the ocean. The south equatorial current and equatorial undercurrent regions have received careful attention from laboratories in the United States, Japan and New Caledonia. A paper from the Soviet Union pointed to the advantages of the southern ocean for studies of relationships between atmosphere and oceanic fluctuations. Another paper, from Hawaii, dealt with the scientific interest of monsoonal effects in the western and eastern tropical regions and commented on the absence of synoptic information from the central part of the ocean south of 20° S.

The biological papers showed that scientists from the United States and the Soviet Union had recently done much to improve our knowledge of primary productivity in the South Pacific ocean, and that the plankton of the equatorial, Antarctic and coastal areas is fairly well known. It was suggested that new work in the central area should aim at elucidating broad bio-hydrographical features, using material collected as quantitatively as modern methods allow. Mead's paper on the distributional history of the fishes showed that the relatively small fauna is composite, from diverse origins. He traced probable