borne by satellites. Some of the basic physical, biological and physiological experiments which can be carried out in earth orbiting spacecraft are discussed, as is the potentiality of manned spacecraft in astronomical and terrestrial communications.

The papers collected together in this book will appeal only to a small group of readers, and particularly to those interested in remote infra-red sensing. There is no systematic treatment of the possibilities of scientific experimentation in manned orbital flight. The quality of many of the illustrations, particularly the photographs, is poor and there is a lack of uniformity in the preparation of the text.

J. ERNSTING

WATER IN THE SKY

The Hydrologic Cycle in the Atmosphere

By O. A. Drozdov and A. S. Grigor'eva. Translated from the Russian by I. Shechtman. Translation edited by R. Hardin. Pp. vi + 282. (Jerusalem: Israel Program for Scientific Translations; London: Oldbourne Press, 1965.) 108s.

THIS translation is an authoritative digest of much Russian work on moisture and moisture transport in the atmosphere. The emphasis is geographical rather than geophysical, climatological rather than meteorological, and largely devoted to the territory of the U.S.S.R. The title would lead one to expect a discussion of the theory of evaporation, of the general circulation of atmospheric moisture, and of the dynamical mechanisms for condensation and precipitation, but these do not appear although some Russian contributions in these fields are outstanding. Attention is by contrast directed to such questions as the statistical relationship between precipitation and atmospheric humidity and the contribution made by local evaporation to local precipitation—questions which seem to be less relevant the more the geophysics is understood. The most valuable chapter is perhaps that on moisture flux in the atmosphere, which includes reference to important work in America and Britain. The chapter on macro-turbulent exchange is also notable as introducing important ideas due to Obukhov, Monin and Yudin.

On the whole, the book has no great novelty, but one must be grateful to the authors for making a survey with almost 300 references, and to the publishers for providing a translation which will find a permanent place in the literature even if its interest is mainly historical. With the International Hydrological Decade upon us, and many new workers and new countries entering the field, this survey monograph of Russian work is particularly opportune.

R. C. SUTCLIFFE

ATOMIC COLLISIONS

The Theory of Atomic Collisions

By Nevill Mott and Harrie Massey. (The International Series of Monographs on Physics.) Pp. xxii + 858. (Oxford: Clarendon Press; London: Oxford University Press, 1965.) 120s. net.

IT is now more than thirty years since the appearance of the first edition of the *Theory of Atomic Collisions*, by N. F. Mott and H. S. W. Massey. The work quickly became established as one of the classics of quantum mechanics and, for several generations of research workers on the quantum theory of scattering, it has been both the book from which they learned their craft and an indispensable reference work. There can be few fields in theoretical physics in which more effort has been expended over the past thirty years than in the quantum theory of scattering. It is all the more a tribute to Mott and Massey's book that it has throughout this period remained the standard

treatise on the subject. Inevitably, the subject has expanded hugely since 1933; a measure of this growth is the fact that the 300 pages of the first edition, increased to 388 pages in the second, have now in the third edition grown to no fewer than 858 pages. Clearly, then, this edition may be regarded in some respects as a new book, but it is striking how well the general spirit and approach of the earlier work have been preserved. Indeed, on certain fundamental topics the original treatment survives with undiminished clarity.

It will perhaps be helpful to give some general idea of the plan of the new edition and of the considerable extent to which it goes beyond the scope of the second edition. The first ten chapters of the book, extending over nearly 300 pages, are devoted to a treatment of single particle scattering in all its aspects. There are some important and valuable new chapters here, in particular those on variational methods, on analyticity properties and the *S*-matrix, and on non-local and absorptive interactions. The next five chapters extend the general treatment first to two body collisions and then to many body collisions. These chapters also contain a great deal of new material such as the treatment of nucleon-nucleon collisions in Chapter XI and of the impulse approximation and multiple scattering effects. A two-state approximation to the general collision problem is developed in Chapter XIII and thereafter the generalized *S*-matrix treatment is described. There follow five chapters dealing with applications of collision theory—four on atomic collisions and one on nuclear collisions. As the authors state, the treatment of applications is not comprehensive but, especially with regard to atomic collisions, it is remarkably full and gives an excellent picture of the progress in this field during the past 10 or 15 years. As in the previous edition, the last two chapters of the book are devoted to the time-dependent perturbation theory approach to collision problems and to a semi-classical treatment of some radiative problems.

From this summary it will be clear that the new edition of Mott and Massey covers a vast amount of ground. It does this with a clarity of expression and a uniformity of treatment which are not always found in works of such an encyclopaedic character. In encompassing so much of the recent expansion of collision theory the authors reveal their long mastery of the subject. In particular, the bias of the book towards the description of the best methods that can be applied to the important problems of atomic and molecular scattering is not surprising in view of the important contributions made over the years to this subject by Professor Sir Harrie Massey and his collaborators. However, the book will be equally valuable to those primarily interested in nuclear collision problems and it also contains excellent discussions of many of the analytical problems of collision theory.

In conclusion, this must be reckoned as a most successful further edition of a book that has already established a great reputation. Although in recent years other texts have appeared which give excellent treatments of certain aspects of collision theory, the new edition undoubtedly provides a more complete discussion of the whole subject than can be found elsewhere.

J. C. GUNN

ATOMIC PHYSICS

Atomic and Nuclear Physics

By Derek L. Livesey. Pp. xi + 525. Solution to Problems in "Atomic and Nuclear Physics". Pp. 91. (Waltham, Mass., and London: Blaisdell Publishing Company, a Division of Ginn and Company, 1966.) \$10.50.

IT is the professed aim of this book to cover the field of atomic and nuclear physics at the senior undergraduate level. Thus it tries to tread the narrow path of a treatment that is neither introductory nor advanced, and it