

BOOK REVIEWS

Relativity, Groups, and Topology. Summer School Proc. (Les Houches, 1963). C. DeWitt and B. DeWitt, eds. 929 pp. Gordon and Breach, New York, 1964. Cloth \$19.50; paper \$9.50.

Reviewed by J. L. Anderson, Stevens Institute.

One of the oldest of the physics summer schools, and one with an enviable reputation for the quality of its transactions, is that held at Les Houches each year. The transactions of the 1963 school are no exception. A large part of the credit must go to the editors, Bryce and Cécile DeWitt, who also run and organize these schools. They have consistently found the best people to expose a given subject, as a glance at the list of lecturers in this volume will attest. Furthermore, the contributions have all been prepared by the lecturers themselves in advance of the presentations so that they are consistently free of the faults one usually associates with summer-school transactions.

The central theme of the 1963 school was relativity theory and the mathematics associated therewith. Two types of lectures are contained in this volume, those which are, in the main, didactic presentations of fairly standard material and those which are presentations of recent research in relativity theory. In the former category are the lectures by Synge on general relativity, by Gursky on group theory, by Dicke on experimental relativity (although this article contains a number of recent contributions in the form of a series of appendices), by Bryce DeWitt on the dynamical theory of groups and fields (although again much of the recent work of this author is contained here), and by Misner on differential geometry from the modern point of view. In the latter category are the lectures by Wheeler on geometrodynamics and the issue of the final state; by R. K. Sachs on gravitational radiation; by Penrose on the conformal treatment of infinity; by Lichnerowicz on propagators, commutators, and anticommutators in general relativity; and by Weber on

gravitational radiation experiments.

While some of the material in this volume will probably be of interest only to the specialist or student in the field, there is enough material of general interest to warrant its recommendation to theoretical physicists in general. Thus Gursky's article on group theory affords a marvelous introduction to both the theory of discrete groups and Lie groups. After one has digested this material he should be in a good position to go on to the more heady works on the subject. Synge as usual has written a delightful review of general relativity with such appealing subject headings as "The Bouncing Photon" and "The Falling Apple". Further, there is much here that does not usually appear in the standard treatments of the subject. Even old relativists, already set in their ways, will find this a profitable article to read. Misner's article on differential geometry is perhaps harder to digest than these other expositions, especially for someone who is unfamiliar with the more modern approach. Fortunately he writes for physicists and includes enough examples so that the reader should come away with some feeling for the subject.

It would be beyond the scope of this review and the ability of the reviewer to comment critically on all of the articles contained in the proceedings. They are all well written and of some interest to a wide and varying audience. Thus Wheeler's article on the issue of the final state should be of interest not only to relativists but to astrophysicists as well, dealing as it does with the problem of gravitational collapse. Similarly, Dicke's and Weber's articles will find an audience among experimental physicists, and DeWitt's long article should be of interest to field theorists in general. Finally, the articles by Sachs, Penrose, and Lichnerowicz should be required reading for anyone who wants to involve himself in the specialties discussed by these authors.

Altogether, *Relativity, Groups, and Topology* is a big book, well written in all its parts and of interest to all and not just the specialist.

Physics of Atomic Collisions. By J. B. Hasted. 536 pp. Butterworths, Washington, D.C., 1964. \$26.00.

Reviewed by Sanborn C. Brown, Massachusetts Institute of Technology.

In 1952, when Massey and Burhop published their classic book entitled *Electronic and Ionic Impact Phenomena*, interest in the processes of electrical discharges had been stimulated by the realization of the importance of these phenomena in space research and controlled thermonuclear fusion. Although the book by Massey and Burhop was right up to date at the time it was published, the great emphasis on these subjects in recent years has made it absolutely essential that the work be extended to cover the developments of the last twelve years. To a large extent this is just what Hasted's book has succeeded in doing. Dr. Hasted is one of the world's recognized experts in this area, and the physics community will welcome his contribution with enthusiasm.

For the professional research worker in the field of plasma physics, Dr. Hasted's book will prove to be essential. As a textbook it will not be as useful as Massey and Burhop. It was probably a necessity imposed by the length of the book which dictated Hasted's decision to concentrate on presenting a complete and thorough compendium of our present knowledge rather than giving physical explanations for many of the phenomena with which he deals. When used in conjunction with the physical treatment in Massey and Burhop, however, it will be both up to date and explanatory.

One area of discussion which will be missed very much by many workers in this field is collision phenomena occurring in magnetic fields. A great deal of interest has been attached in recent years to gas-discharge and