Structure from reactions

STUDIES OF NUCLEAR REACTIONS. Vol. 33, Proc. (Trudy) P. N. Lebedev Physics Institute. D. V. Skobeltsyn, ed. Trans. from Russian by S. Chomet. 222 pp. Consultants Bureau, New York, 1966. Paper $22.50

by Henry S. Valk

Increasing interest has been displayed lately in the study of the structure of light nuclei as revealed through nuclear reactions. Many of these investigations have centered on excited states in the lightest nuclei, such as the alpha particle.

It is most timely, therefore, that we now have available a translation of *Studies of Nuclear Reactions*, volume 33 in the continuing series of the proceedings of the P. N. Lebedev Institute. This volume contains a series of nine experimental and theoretical papers in nuclear reactions.

For the most part, the articles are sufficiently detailed that they can be read with profit by physicists in other fields and by graduate students. This readability is particularly true of the first three papers which concern recent experimental results on the interaction of three-nucleon systems with protons and deuterons. For example, this reviewer found the dissertation "Interactions of Protons with Tritium at Energies Below the (p,n) Reaction Threshold" by A. B. Kurepin a most valuable summary of the work in this area prior to 1965.

The usefulness of the current volume makes one look forward to the release of others in this series.

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The reviewer, chairman of the physics department at the University of Nebraska, is interested in high-energy and theoretical physics.

Controversial deformation theory

PARTICLE WAVES AND DEFORMATION IN CRYSTALLINE SOLIDS. By Edwin R. Fitzgerald. 249 pp. Interscience, New York, 1966. $11.95

by Walter G. Mayer

Some of the unique ideas concerning particle waves in solids discussed in this book have already been published

by the author in various scientific journals. For a number of years the approach taken by Fitzgerald has been criticized, for experimental and theoretical reasons, and it is thus to be expected that the present book will again create a controversy.

The basic aim of the book is the calculation of macroscopic quantities associated with the deformation of crystalline solids. Wave mechanics is to be used for this purpose and since in-practice rather than in-principle results are to be found for the explanation of nonelastic resonances, mean elastic sound velocities, characteristic stresses and other mechanical quantities, the author proceeds to change a few time-honored aspects of wave mechanics. It is debatable, however, whether some of the experimental results reported by the author should actually be explained in terms of wave mechanics, orthodox or modified. Furthermore, the validity of some of the experimental results to be explained here (by the modified wave mechanics approach) has been questioned long before the book was published. Doubts were voiced with so much compassion that a hastily arranged experimental demonstration was given by the author one day, at high noon, during the 1960 Providence meeting of the Acoustical Society. Despite the demonstration there are still researchers who are looking for the Fitzgerald effect.

To be sure, the book also discusses phenomena other than the controversial Fitzgerald effect. The author selects to explain them too, by applying his theory of particle waves. Nevertheless the fact remains that one may also explain some of the macroscopic phenomena by other theories. No matter how difficult it will be for the individual reader to accept Fitzgerald's unique approach he will accept at least the very first sentence of the preface which says, "The idea that there is a close connection between particle waves and the macroscopic deformation of solids will be surprising to many and distasteful to some."

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The reviewer teaches physical acoustics and solid-state physics at Georgetown University, Washington, D.C.