

In epistemological and philosophical attitude the reviewer finds particular resonance with the views expressed in this volume—even though, as noted by Dr. Bohm, these are not [all] necessarily those generally held. Yet, indeed in consequence, I am sure that the critical and physical insight evidenced therein will be well received and welcomed by most teachers and students. Indeed, the concise and well balanced interplay, point-counterpoint, between formalism and interpretation is one of the most unusual and notable features of this very welcome book.

It is really not possible, in a reasonably short review, to give many specific examples of the character which is only suggested above, but we may mention a most important one which is consistently carried through the entire book; viz., the philosophical interpretation and methodological handling of wave-particle duality. Dr. Bohm quite rightly deals with these as mutually exclusive "synecdochal" aspects of a "primitive" (or if you will, syncategorem), and carries consistently through. Nowhere, as in another recent release, does one find the classic paralogism: . . . the nonrelativistic theory is competent only for experiments in which particles act like waves!

It may be remarked that Dr. Bohm usually gets right to the point, without hesitation or circumlocution, in both discussions and proofs—so that some of the individual sections seem surprisingly short. This simply proves again that the shortest route is still via logical thinking and sureness of one's own domain.

The book is divided into six parts: Physical Formulation of the Quantum Theory (172 pp.); Mathematical Formulation of the Quantum Theory (56 pp.); Applications to Simple Systems. Further Extensions of Quantum Theory Formulation (178 pp.); Methods of Approximate Solution of Schrödinger's Equation (104 pp.); Theory of Scattering (72 pp.); Quantum Theory of the Process of Measurement (45 pp.); Index (18 pp.).

The material in each part is well organized and handled so as to give a concise, unified, and coherent picture of the subject; excessive repetition of well-known elementary systems is avoided by the expedient of reference to a few carefully selected books, and the same technique prevents the landscape from becoming littered with the usual tables of functions, their derived relatives, shapes and sizes. The treatment of sudden and adiabatic perturbations, concepts in scattering, theory of measurement, etc., is especially good—the more so for an introductory, or intermediate, level.

The publishers can be pleased with a well planned format, clearly presented and spaced for comfortable reading. I believe that this is one of the few mature, intermediate books for the relatively mature student, and, for the area it covers, probably the best now available.

E. M. Corson
New York City

Books Received

TABLES RELATING TO MATHIEU FUNCTIONS—CHARACTERISTIC VALUES, COEFFICIENTS, AND JOINING FACTORS. Prepared by The Computation Laboratory of the National Applied Mathematics Laboratories, National Bureau of Standards. 278 pp. Columbia University Press, New York, 1951. \$8.00.

THERMODYNAMICS OF FLUID FLOW. By Newman A. Hall. 278 pp. Prentice-Hall, Inc., New York, 1951. \$5.50.

HOW TIME BEGAN. By E. M. Tingley. 12 pp. E. M. Tingley, 221 North Cuyler Avenue, Oak Park, Illinois. Free postpaid.

AN INTRODUCTION TO THE LAPLACE TRANSFORMATION. By J. C. Jaeger. 132 pp. John Wiley and Sons, Inc., New York, 1951. \$1.50.

AN INTRODUCTION TO ELECTRON OPTICS. By L. Jacob. 150 pp. John Wiley and Sons, Inc., New York, 1951. \$2.00.

ACTES DU COLLOQUE INTERNATIONAL DE MÉCANIQUE—POITIERS 1950 (Tome Premier). Publications Scientifiques et Techniques du Ministère de l'Air. 298 pp. Service de Documentation et d'Information Technique de l'Aéronautique, Paris, 1951.

MUSICAL ACOUSTICS (Third Edition). By Charles A. Culver. 215 pp. The Blakiston Company, Philadelphia, 1951. \$4.25.

ADVANCED FLUID DYNAMICS AND FLUID MACHINERY. By R. C. Binder. 426 pp. Prentice-Hall, Inc., New York, 1951. \$6.00.

ÉCOULEMENTS DES FLUIDES COMPRESSIBLES. By R. Sauer. 307 pp. Librairie Polytechnique Ch. Beranger, Paris, 1951.

GLASS. A Handbook for Students and Technicians. Edited by J. Home Dickson. 300 pp. Hutchinson's Scientific and Technical Publications, London, 1951. 25s.

THE PREPARATION OF PROGRAMS FOR AN ELECTRONIC DIGITAL COMPUTER. By Maurice V. Wilkes, David J. Wheeler and Stanley Gill. 167 pp. Addison-Wesley Press, Inc., Cambridge, 1951. \$5.00.

LINEAR COMPUTATIONS. By Paul S. Dwyer. 344 pp. John Wiley and Sons, Inc., New York, 1951. \$6.00.

A CONCISE HISTORY OF ASTRONOMY. By Peter Doig. 320 pp. Philosophical Library, New York, 1951. \$4.75.

INTRODUCTION TO SERVOMECHANISMS. By A. Porter. 154 pp. John Wiley and Sons, Inc., New York, 1951. \$1.75.

AN INTRODUCTION TO THE THEORY OF CONTROL IN MECHANICAL ENGINEERING. By R. H. Macmillan. 195 pp. Cambridge University Press, New York, 1951. \$6.00.

THE PHOTOGRAPHIC STUDY OF RAPID EVENTS. By W. D. Chesterman. 167 pp. Oxford, at the Clarendon Press, 1951. \$4.25.

PHYSIK UND TECHNIK DER ULTRAROTSTRAHLUNG. By Werner Brügel. 257 pp. Curt R. Vincentz Verlag, Hannover, Germany, 1951. DM 23.50.

TABLES OF THE BESSEL FUNCTIONS OF THE FIRST KIND OF ORDERS SEVENTY-NINE THROUGH ONE HUNDRED THIRTY-FIVE. By the Staff of the Computing Laboratory. 614 pp. Harvard University Press, Cambridge, 1951. \$8.00.

SOME ASPECTS OF FLUID FLOW. Papers Presented at a Conference Organized by the Institute of Physics at Leamington Spa on 25–28 October, 1950, and the Reports of the Conference Discussion Groups. 292 pp. Longmans Green and Company, New York, 1951. \$9.50.

THEOLOGIE UND PHYSIK. By Heimo Dolch. 110 pp. Verlag Herder, Freiburg im Breisgau, Germany, 1951. DM 4.80.

We hear that...

Nelson M. Duller, Jr., a candidate for the PhD degree in physics at Rice Institute, has received Humble Oil & Refining Company's 1951-52 fellowship in physics.

Enrico Fermi, winner of the Nobel Prize for physics in 1938, and Distinguished Service Professor at the Institute of Nuclear Studies of the University of Chicago, was recently a visiting lecturer in physics at the University of Rochester. **E. Paul George**, cosmic ray specialist from Birbeck College, University of London, has been a guest lecturer in physics during a three-month period beginning in January.

Nathaniel H. Frank has been appointed head of the physics department at Massachusetts Institute of Technology, succeeding **John C. Slater**, recently appointed Institute Professor. Professor Frank, who has been associated with MIT since receiving his PhD there in 1927, held the post of Expert Consultant in the Office of the Secretary of War during part of World War II.

James N. Goodier, professor of applied mechanics at Stanford University, has been appointed visiting lecturer in the division of applied sciences at Harvard University for the first semester of the academic year 1951-52. **Arthur Kantrowitz**, professor of aeronautical engineering and of engineering physics at Cornell University, will be a visiting lecturer in fluid mechanics for the second half of the year.

Physicists who have recently joined the staff of the Oak Ridge National Laboratory are: **Joseph A. Halford** from Humble Oil & Refining Company; **Otto W. Hermann, Jr.** from Murray State College; **David T. James, Jr.** from Ohio State University; **Wiley A. Johnson** from Carson-Newman College; **Marvin T. Morgan, Jr.** from Consolidated Vultee Aircraft; **Richard K. Osborn** from Case Institute of Technology; **Harry L. Reynolds** from the University of Rochester; and **Marvin Slater** from Yale University. **Richard A. Erickson**, Oak Ridge graduate fellow, has accepted a position as acting assistant professor of physics at the University of Tennessee.

J. Hans D. Jensen, director of the Institute for Theoretical Physics of the University of Heidelberg, is spending the first term of 1951-52 at the University of Wisconsin as Carl Schurz Professor. **D. A. Lind**,

who has recently returned to the United States after a year in Stockholm and Zurich as a Guggenheim Fellow, has joined the University's physics department as assistant professor.

Haldon A. Leedy, vice president and director of Armour Research Foundation and a past president of the Physics Club of Chicago, has been named to the board of directors of Nuclear Instrument and Chemical Corporation.

Herbert M. Meyer, editor for Engineering Index, Inc., New York City, has been named an associate metallurgist in the metals research department at Armour Research Foundation of Illinois Institute of Technology.

Cyril H. Meyers, National Bureau of Standards physicist who was for many years associated with the heat measurements section, has retired. **Archibald T. McPherson** has been named an associate director with responsibility over the Bureau's work in calibration, testing, and specifications. The Bureau has also announced the appointments of **Frank Wenner**, consulting physicist for the Rubicon Company, and **David White**, acting assistant director of the cryogenics laboratory at Ohio State University, to its staff of consultants.

E. G. Shower, formerly a member of the technical staff of the Bell Telephone Laboratories where he has worked on the final development of the transistor and allied devices, has joined the staff of Radio Receptor Company in Brooklyn as chief engineer of the newly-formed germanium division.

George A. Simon has recently been assigned to the Army Chemical Corps Chemical and Radiological Laboratories to do research in physics and physical chemistry.

Elmer E. Stickley, formerly of the Pittsburgh Plate Glass Company and a past president of the Physical Society of Pittsburgh, has joined the medical department of Brookhaven National Laboratory where he will correlate physical and biological measurements of effects of radiation on living cells. **G. J. Dienes**, secretary of the Society of Rheology and formerly of the atomic energy research department of North American Aviation, Inc. at Downey, California, has joined the Brookhaven department of physics.

Francis C. Todd has been named supervisor of a newly-formed division of electronic physics at Battelle Memorial Institute. A member of the Battelle staff since 1942, Dr. Todd has been associated with much of the Institute's recent electronics research.

Arthur H. Warner has resigned as technical director of the Air Force Missile Test Center, Cocoa, Florida, to join the Pasadena branch of the Office of Naval Research as head of the scientific section.

News and views

A Letter to the Editor

Visas for Visiting Scientists

Sir:

There are a large number of foreign scientists, friendly to the United States, who have difficulty entering this country. American visa policy is harmful, not only to those denied temporary admittance, but also to Americans.

The McCarran Act (which the visa division of the State Department is enforcing with the zeal of people who want to say "I told you so") bars members of "Communist-front" organizations from this country. If a scientist wishes to enter this country, *even temporarily*, and he has joined an organization which we call a "Communist-front", he is denied a visa. This happens even if he joined the organization to counter the Communist influence in it. If a jealous colleague falsely denounces him as a Communist, he cannot be admitted, and never even knows the charges against him. If he is willing to wait six months or so, and is eminent enough, the Attorney-General may let him in under special dispensation.

What are the results of this policy? First of all, we lose the opportunity of meeting these people and learning about their work. This hurts us, not them. Secondly, at least one foreign scientist has closed his lab to visiting Americans. Thirdly, our scientific representatives abroad, who are supposed to find out what is going on in Europe for our benefit, do not get a very cordial reception when they visit excluded scientists or their friends. Fourthly, it is hardly a good method of showing Europe the advantages of freedom. All these results hurt America.

It seems possible that the law may be changed. I would think that physicists would have a vital interest in such legislation. Furthermore, scientists are now getting extra special treatment, since decisions, instead of being made abroad, are made in Washington. This leads to intolerable delays, and many mistakes are made.

It may be that all future international meetings should not be held in the United States. I personally feel that this would be unfortunate.

David Z. Robinson
Physicist, Baird Associates

Science and Foreign Relations

A State Department Headache

The concern experienced by many American scientists during the past months over the government's manner of handling the visa applications of foreign

scientists is based, it has been stated many times over, on a belief that American science cannot be isolated from the rest of the world and still remain healthy and productive. While the interchange of scientists between this and other nations has been greatly stimulated in recent years and is an accepted and approved concept in high government circles, there still seems good reason for supposing that the predicament described in the foregoing letter is real and that it constitutes a threat not only to American scientific progress but also to our foreign scientific relations. It should nevertheless be kept in mind that although the situation has become more aggravated than usual, it is not altogether new.

The visa division of the Department of State is now and for many years has been bound by the provisions of the Immigration Act of 1918, which was directed primarily at Communists and which expressly excludes from the United States any aliens who believe in, advocate, or are in any manner associated with any organization that believes in or advocates the overthrow by force or violence of the government of the United States. Passage of the Internal Security (McCarran) Act of 1950, which was directed not only against communism but against totalitarianism in general, did not change the basic provisions of the Immigration Act although it did enlarge the categories of political activity under which aliens might be found inadmissible.

According to a formal statement of policy issued by the State Department almost one year before passage of the McCarran Act, the terms of the 1918 Immigration Act have always been applied literally. The sense of this particular policy statement, which deals with the admission of aliens desiring to attend conferences held in the United States, appears to be that while the Department wishes to encourage the free interchange of persons and ideas on a world-wide basis, it would not facilitate the attendance at meetings held in this country of any person whose presence it is believed would endanger the safety of the nation and whose entry is therefore forbidden by law—unless the case seems to have significant bearing on the conduct of American foreign relations. According to the policy statement, however, "... the Department of State will not actually take action unless in its judgment the admission of the particular individual would be in the national interest. The only action which the State Department can take is to make or endorse a recommendation to the Attorney General that he authorize the admission of the individual for a limited period of time."

It will be recalled that there have been numerous instances, prior to the McCarran act, in which foreign scientists have experienced difficulty in obtaining visas for travel in the United States. The State Department has been well aware of the problems arising from such instances, if for no other reason than the volume and character of the protests received from American scientists whenever a respected foreign colleague has been unable to enter the country.

The need for good foreign scientific relations has been

dealt with at considerable length in reports issued by the Department—most recently and perhaps most eloquently in the report of its international science policy survey group, *Science and Foreign Relations*, which is concerned with the international flow of scientific and technological information. Among the fundamental premises upon which the report was declared to be based are the following:

"1. Since science is essentially international in character, it provides an effective medium by means of which men can meet and exchange views in an atmosphere of intellectual freedom and understanding. It is therefore an effective instrument of peace.

"2. The healthy development of American science and technology that is essential to our national existence requires that American scientists have free access to and be fully aware of scientific thought everywhere, and that they join in its creation. American access to foreign scientific sources implies of necessity a two-way flow of scientific information if our access is to be anything but sketchy and difficult. We in America are dangerously prone to underestimate the importance of foreign scientific progress. American preeminence as demonstrated thus far is in the application of scientific discovery; hence it is to our practical advantage to promote the fullest scientific intercourse."

With reference to the handling of visa applications of foreign scientists, the substance of the argument contained in this State Department report (issued in May 1950—several months before the McCarran Act) is that while the international exchange of scientific personnel is accepted as being favorable to American scientific progress and therefore unquestionably in the national interest, still the national laws with respect to immigration and the granting of visas make "no special allowance for such cases as scientists who are Communists or who have Communist affiliations and who, by invitation or otherwise, seek to visit the United States on a temporary basis in order to attend scientific meetings and to confer with American scientists". The determination of precisely what constitutes Communist or other totalitarian affiliation must be assumed to be even more difficult in the case of a foreign national than it is where an American citizen is concerned. Errors in judgment, false testimony, misleading evidence, and similar reasons for miscarriages of justice are not easy for a visa applicant to straighten out unless he is presented with a list of charges to refute. And since it clearly could not be considered diplomatic for American embassy representatives to accuse citizens of other nations of disloyalty to the United States, such a procedure must be considered unlikely.

Unfortunately, it appears that citizens of nations now maintaining cooperative relations with the United States are more apt to be affected by visa difficulties in entering this country than are those nationals residing behind the Iron Curtain, for the latter are not ordinarily encouraged to travel abroad by their home governments except in some official capacity, in which case the individual would travel with diplomatic credentials. In view

of State Department efforts to establish improved foreign scientific relations through its science staffs attached to selected United States diplomatic missions abroad, it might be assumed that the Department would not be anxious to stir up trouble for itself by capriciously refusing to grant or causing delays in the granting of visas to foreign scientists. The rigid prohibitions inherent in both the Immigration and Internal Security Acts, however, provide little latitude for liberal interpretation, and, even were it to be so disposed, the State Department, which has been obliged to absorb more Congressional punishment in recent months than have most other elements of the Administration, is not in the best position to embark on any adventure, however courageous, that might be termed in violation of national laws. This being the case, it seems self-evident that amendments to the Immigration Act, as well as to the McCarran Act, will be needed before any satisfactory solution to the visa problem can be found.

National Science Foundation

First Annual Report Submitted to Congress

The first annual report of the National Science Foundation was transmitted to Congress on January 15th by the President, who stated that the funds appropriated for the Foundation's programs "represent a long-term investment in the national security no less than the funds presently being invested in the expansion of productive capacity to carry us through a long period of partial mobilization". Since the Foundation has only recently begun to function and since few of its programs had actually been put into effect by the end of last year, the report "is by necessity a report of progress in formulating plans", as James B. Conant, chairman of the National Science Board, made clear in his foreword to the document.

Nearly half of the report's text is concerned with the case for federal support of basic scientific research, and much emphasis is placed upon the critical situation arising from the rapidly dwindling time lag between fundamental discoveries in science and their practical application. The most immediate problem before the Foundation, says the report, is the relation of the present emergency to the support of basic research, and in this respect, it is stated, the point of view from which the Foundation is planning its program may be summarized as follows:

Since both the degree and the duration of the present emergency are uncertain, it is clear that the United States must—

a. with all dispatch, put itself into what the military call "operational readiness," and

b. take the necessary steps to maintain itself in this state of readiness for an extended period, perhaps for many years.

This should be done with the realization that at any time the emergency may turn into a crisis.

In respect to science, our national policy requires that urgent military uses of science should be expe-