

has been well justified in practice, according to the Commission. Location of a proving ground within the United States, furthermore, has made it possible for civil defense personnel to take part in the tests, thus increasing the potential usefulness of the entire civil defense program.

The full report can be obtained (50 cents per copy) from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

National Science Foundation

Federal Research and Development Survey

According to information compiled by the National Science Foundation in connection with its continuing studies of the research and development activities of the federal government, \$1839 million was spent by federal agencies on scientific research and development during the fiscal year 1952. The corresponding estimate for the 1953 fiscal year is \$2189 million, and amounts included in the President's budget of January 9th for these purposes total \$2327 million for fiscal year 1954.

Funds administered by the Department of Defense accounted for about seventy-two percent of the 1952 total, compared with fourteen percent for the Atomic Energy Commission and four percent for both the National Advisory Committee for Aeronautics and the Federal Security Agency. The remaining funds were expended by twenty other agencies. Similar ratios are indicated in the estimates for fiscal years 1953 and 1954.

Obligations for increasing existing federal research facilities or construction of new laboratories amounted to \$307 million for 1952, of which \$198 million was for the Department of Defense, \$60 million for the AEC, and \$31 million for the NACA.

The table at the bottom of this page summarizes all information assembled by NSF on obligations and expenditures for research and development for the three fiscal years. Reporting agencies include the Agriculture, Commerce, Defense, Interior, Labor, Post Office, State,

and Treasury Departments, the Atomic Energy Commission, Federal Civil Defense Administration, Federal Communications Commission, Federal Security Agency, Government Services Administration, Housing and Home Finance Agency, Interstate Commerce Commission, National Advisory Committee for Aeronautics, National Science Foundation, National Security Resources Board, Office of Defense Mobilization, Reconstruction Finance Corporation, Smithsonian Institution, Tariff Commission, Tennessee Valley Authority, and Veterans Administration.

Graduate Students in Science

Survey Says More Could Be Accepted

A nation-wide survey of graduate students in the natural sciences, recently completed for the National Science Foundation by the Office of Scientific Personnel of the National Research Council, indicates that graduate schools in this country could accept nearly 8000 more students for doctoral studies and about 11,400 more students for work towards masters' degrees in science.

The survey of the graduate science population and the training potential of the nation's graduate-science institutions, covering the academic year 1951, finds that 7800 of the 16,250 first-year graduate students have the necessary qualifications to earn doctoral degrees, but predicts that nearly three out of five of these "doctoral-potential" students probably will not complete their studies to the doctorate. Twenty-nine percent more first-year graduate students can now be accepted by American universities and graduate schools, according to the survey, which indicates that the large college graduating classes of 1949 and 1950 will result in a peak of new doctorates in 1953, with a probable decline beginning in 1954. There were altogether about 39,800 graduate students receiving training in the natural sciences during 1951.

The ten fields reporting the largest number of graduate students in 1951 were chemistry (6872), psychology

Estimated Obligations and Expenditures (in millions of dollars) of the Federal Agencies for Scientific Research and Development in Fiscal Years 1952, 1953, and 1954, as compiled by the National Science Foundation.

Agency	Obligations			Expenditures		
	1952 (Actual)	1953 (Estimate)	1954 (Estimate)	1952 (Actual)	1953 (Estimate)	1954 (Estimate)
Department of Defense	1705	1850	1805	1315	1600	1700
Atomic Energy Commission	229	262	281	250	292	288
National Advisory Committee for Aeronautics	82	95	71	67	76	95
Department of Agriculture	56	66	61	57	60	69
Federal Security Agency	53	67	78	65	74	65
Department of Interior	36	36	39	33	37	39
Department of Commerce	31	23	39	28	24	39
Other agencies	25	28	37	24	26	32
Total, all agencies	2216	2427	2411	1839	2189	2327

Note: Column items may not add to totals due to rounding.

The Wiley Bulletin

PHYSICS TODAY EDITION

APRIL 1953

WHAT HAPPENS ON TUESDAY...

Many citizens, later to hold responsible positions in life, leave college with but one course in science. Yet problems posed by science and technology will face them daily. To show these students that scientific advances of one day must affect life every day thereafter, Richard Wistar of Mills College has written *Man and His Physical Universe: An Integrated Course in Physical Science*. Building on a framework of everyday experience, the author cuts across chemistry, physics, geology, and astronomy to arouse interest and appreciation of the many contributions science makes to daily living. Items accepted as well-known facts are presented first. Then demonstrable though unfamiliar facts pave the way for presenting theories acknowledged as the best representations of the physical world's nature. The interdependence of the sciences is the theme that unifies Wistar's *Man and His Physical Universe*. April. 488 pages. \$4.75.

STRONG USE OF PHYSICAL PICTURES

What really stands out in the new, completely revised edition of Ramo and Whinnery's *Fields and Waves in Modern Radio* is its use of physical pictures to supplement the mathematics and its stress on practical results following from theory.

The physicist will be interested in the book's approach to applied electromagnetic theory, while engineers will find much of value in the new edition's offerings on the fast-moving subject of microwaves. Note also the fundamental approach to many subjects through Maxwell's Equations. Ready in May. Approx. 547 pages. Prob. \$8.00.

EXCLUSIVE!

Stochastic Processes, by J. L. Doob of the University of Illinois, is the only book to cover in detail the mathematical basis of the subject. Since the book is unique, elementary definitions and theorems are set forth at some length. March. 654 pages. \$10.00.

EMILIO SEGRÈ AND EXPERIMENTAL NUCLEAR PHYSICS

New Volumes Expected to Improve Communications Among Nuclear Experimenters

Demobilization of many physicists working on government projects plus an upsurge of interest on the part of students in nuclear investigation, have intensified the need for some sort of order in this swiftly growing field. Emilio Segrè, now working at the University of California at Berkeley, has taken on the job of filling that need. Realizing that no one man could possibly cover the entire field with any degree of authority, Dr. Segrè has enlisted the aid of a veritable "Who's Who" in nuclear physics. The resulting volumes constitute a handbook of experimental techniques, pointing out significant facts and data and outlining the broad lines of present-day theoretical work.

Built on the lines of the classic German handbooks, *Experimental Nuclear Physics* concentrates in its separate parts on giving reasonably complete treatises by acknowledged authorities. Each part is expected to bring the reader up to date (1951) and to point out further details by bibliographic reference.

Volume I: by Hans Staub, Hans Bethe, Julius Ashkin, Norman F. Ramsey, and K. T. Bainbridge. March. 789 pages. \$15.00.

Volume II: by Philip Morrison and Bernard Feld. Ready in August. Approx. 470 pages. Prob. \$9.00.

With the publication of the third and last volume of *Experimental Nuclear Physics* (now in preparation), the field will have an authoritative source of information on every significant aspect of applied nuclear research.

MISCELLANY

Numerical Solution of Differential Equations, by W. E. Milne, Oregon State College. 1953. 275 pages. \$6.50.

Thermionic Vacuum Tubes and Their Applications. By W. H. Aldous and E. Appleton. A Methuen Monograph. 1952. 160 pages. \$2.00.

Radio Astronomy. By B. Lovell and J. A. Clegg. 1952. 238 pages. \$4.00.

Heat Transfer Phenomena; The Flow of Heat in Physical Systems. By R. C. L. Bosworth. 1952. 211 pages. \$6.00.

Radiations and Living Cells. By F. G. Spear. 1953. 222 pages. In press.

AGE OF ELECTRONICS?

With nuclear fission and thermonuclear fusion commanding today's headlines, it is easy to bypass the tremendous strides taken recently in electronics. Yet the progress in this field may well have implications for science and technology as great as the spectacular atomic developments.

For example, who could foresee a 500-page book on oscillators alone? But it has now been proved that the subject merits such a treatment. William A. Edson, Director of Georgia Tech's School of Electrical Engineering has just published with Wiley his new *Vacuum-Tube Oscillators*. It covers every phase of oscillator activity and phenomena and offers the last word in oscillator design and analysis. February. 476 pages. \$7.50.

DEMONSTRATES RESULTS

Wolfgang Thron of Washington University eliminates the convenient but dangerous phrase "It can be shown" from his new book, *Introduction to the Theory of Functions of A Complex Variable*. All results are derived from a simple set of axioms, using the theorem-proof form. The result: firm grounding in fundamentals; an excellent introduction to topology; a handy reference for complete proofs. February. 230 pages. \$6.50.

MIDDLE ROAD IN CONTROL

Rounding out the literature in the field, *Electric Control Systems* stands between the standard books on machinery and advanced analyses of feedback control. The author, Richard W. Jones of Northwestern Technological Institute, ties together the subjects of machinery, electronics, circuits, and transients to develop a sound understanding of control systems. The book's highly functional approach keeps the objectives of the controller always in the foreground. March. 511 pages. \$7.75.

Copies of any of these books may be obtained on approval by writing to the publisher:

JOHN WILEY & SONS, Inc., 440 Fourth Avenue, New York 16, N. Y.

(5221), physics (4971), zoology (3084), mathematics (3071), biology (1933), geology (1864), bacteriology (1343), physiology (1155), and botany (1014). Predictions made by the graduate schools indicate that in 1953 and 1954 the proportion of doctoral degrees in chemistry and physics will probably decline. About three-fourths of the graduate-science student population are enrolled in schools granting PhD degrees in science.

A large fraction of the graduate student population received support for training as graduate assistants and graduate fellows. In 1951, about 1700 graduate assistantships and 4000 nongovernment fellowships were awarded in support of advanced training, while more than 8000 students received graduate aid under the G. I. Bill. In 1952, the number of graduate students receiving aid under the G. I. Bill was sharply reduced, and new programs such as that of the National Science Foundation are not adequate to take up the slack. In this connection, the Foundation has reported receiving a total of 3318 applications for graduate fellowships in the physical, mathematical, engineering, biological and medical sciences for the 1953-54 academic year. From this number, only 600 NSF fellows can be selected in view of the Foundation's limited budget.

AIP Officers

New Executive Committee Named

The Governing Board of the American Institute of Physics, at its meeting on March 14th in New York City, re-elected George R. Harrison as Chairman for 1953. Others named as members of this year's Executive Committee are Karl K. Darrow, Frederick V. Hunt, Brian O'Brien, Frederick Seitz, George B. Pegram, and Mark W. Zemansky. Dr. Pegram continues as Treasurer, Henry A. Barton as Director, and Wallace Waterfall as Secretary of the Governing Board and Executive Committee. A complete list of Governing Board members for 1953 will be found on page 3 of this issue.

Alpha, Alpha, Alpha

A Letter to the Editor

I was favorably impressed by Professor Gamow's suggestion (*Physics Today*, February 1953) that the names of authors in multiauthor articles appear in alphabetic order; however, I feel obligated to point out that this may lead to the practice of scientists adopting "noms de plume". This tendency would, of course, be most likely to arise in the N-Z group, but others amongst us might be swept into the maelstrom.

C. J. Aaronson (née Aronson)
Naval Ordnance Laboratory

Miscellany

The homogeneous reactor at the Oak Ridge National Laboratory, which has been operated at low power during the past year in experiments to deter-

mine nuclear characteristics, was brought up to its full design power of one thousand kilowatts of heat output on February 24th. The reactor steam was then switched to a turbine-generator and enough electricity was produced (about 150 kw) to meet the estimated needs of fifty average five-room dwellings, according to the Union Carbide and Carbon Corporation, which operates the Laboratory for the AEC. Although capable of producing both fissionable material and electric power, the homogeneous reactor, intended as a pilot model, was not designed to produce economic electric power.

"T-particles", introduced late last year to explain certain peculiar events appearing in high-altitude cosmic-ray plates, may not be needed, according to word from Cornell University. The otherwise unexplained presence of T-shaped tracks found in their emulsions had been suggested by Brookhaven's M. Blau and E. O. Salant as being a result of "the break up of the heavy, slow T-particle at (or near) the end of its range into two fast, singly-charged particles, the break up occurring either by decay of the T-particle or by its annihilation with one of the charged particles of the emulsion". In the February 1st issue of *The Physical Review*, the Cornell team of Barrett, Cocconi, and Eisenberg reports that the number of such events found in their search for T-tracks seemed to be "well accounted for by chance coincidences". They conclude that "in order to explain the occurrence of the T-tracks observed in our plates, it is not necessary to postulate the existence of any special particles".

The preservation of wine by exposure to ultra-high-frequency radiation is the subject of recent experiments carried out in France. M. Lafargue of the Central Radio School in Paris, writing in last month's issue of the magazine, *Radio-Electronics*, describes the use of wavelengths ranging from several millimeters to 1.2 meters to improve the keeping qualities of wines during the aging process. Decreases of ten to thirty-four percent in the volatile acid content and the retardation of the "turning" of wines were observed as a result of uhf treatment. The exact mechanism by which these effects are produced is not known.

Laboratories

The Applied Physics Laboratory of Johns Hopkins University is constructing a new \$1.6 million laboratory on a 216-acre site in Howard County, fifteen miles from Silver Spring, Maryland. The new university building, which will provide completely air-conditioned office and laboratory space for two hundred and fifty people, should be completed in about a year.

The University of Arizona, Tucson, is planning to establish a radiocarbon dating laboratory under the direction of Emil W. Haury, head of the university's department of anthropology and director of the Arizona State Museum. Edward N. Wise will serve as technical supervisor of the age determination program, which will be supported by a \$6000 grant from Research Corporation. The new carbon 14 laboratory, to be constructed