
Miscellany

Publications

A 336-page *Purchase Guide for Programs in Science, Mathematics, and Modern Foreign Languages* has been compiled for the Council of Chief State School Officers under a project directed by Edgar Fuller, executive secretary of the Council. Brief descriptions (an item number, accepted name, short statement about its possible uses in instruction, and functional specifications) are given for each of approximately one thousand items of equipment used for instruction in elementary science, mathematics, general science, modern foreign languages, biology, chemistry, and physics. Each item is coded to indicate suggested areas of instruction and the level (basic, standard, or advanced) in which it is believed to find its greatest usefulness. The book also contains short essays on special problems of instruction and a select list of books and films for each area. Copies of the *Purchase Guide* are available at \$3.95 per copy from Ginn and Company, Statler Building, Boston 17, Mass.

A new quarterly publication, *Nuclear Safety*, has been established by the Atomic Energy Commission as a part of its Technical Progress Review series. The periodical will deal with developments in reactor design, construction, and operation; fabrication and reprocessing of reactor fuels; and handling of fissionable material, including shipment and storage. Intended to serve as an informational aid to reactor designers and builders, reactor fuel specialists, regulatory and public safety officials, and others concerned with nuclear safety, the quarterly is available by subscription at a rate of \$2 per year (individual copies may be obtained for 55¢) from the Superintendent of Documents, US Government Printing Office, Washington 25, D. C.

Another reference work intended for the use of reactor specialists is a new compendium entitled *Physical and Engineering Properties of Materials for Nuclear Fuel Elements*. Compiled by Henry H. Hausner, adjunct professor at the Polytechnic Institute of Brooklyn, it has been published by Sylvania-Corning Nuclear Corporation, Bayside, L. I., N. Y. The 55-page booklet, priced at \$1, contains eighty tables giving thermal-neutron cross sections of fifty commonly available elements, as well as various physical and thermal properties of uranium, uranium alloys, thorium, plutonium, ceramics, zirconium and Zircaloy-2, aluminum, stainless steel, graphite, and other high-temperature materials.

The Division of Mathematics of the National Academy of Sciences—National Research Council has

announced the appearance of its annual list of Visiting Foreign Mathematicians. This bulletin includes information regarding mathematicians and statisticians spending some part of the current academic year in the United States and gives the dates of their visit together with the host institution. Since many visiting scholars have limited resources, they often welcome invitations to give lectures or informal talks to college, community, or other groups. Copies of the list may be obtained by writing to the Division of Mathematics, National Academy of Sciences—National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

The National Inventors Council, which serves as the liaison agency between the armed forces and the nation's civilian inventors, has, in this year's burst of wishful thinking, released a new list of some 300 unsolved problems to challenge the inventive ingenuity of persons whose interests may range from problems of long-range space vehicle flight to those associated with the mechanical details of machine tooling small parts. The Council, whose chairman is C. S. Draper, head of the Department of Aeronautics and Astronautics at the Massachusetts Institute of Technology, is composed of scientists and engineers and the heads of research of the Army, Navy, and Air Force. Its administrative staff is a part of the Department of Commerce's Office of Technical Services, whose director, John C. Green, serves as executive director of the Council. The list includes problems in many fields. In electronics, improved transistors and microwave oscillators are needed, as are self-activating spare electronic components to go into operation automatically as other parts fail. New adhesives for explosives, solar cells, metals, and fabrics are needed, as are new instruments such as improved airspeed indicators, a fuel contamination detector, and specialized computers. The complete list may be obtained on request from the National Inventors Council, US Department of Commerce, Washington 25, D. C.

Awards

The Nobel Prize in physics for 1959 has been won jointly by two Berkeley experimentalists, Emilio Segrè and Owen Chamberlain, for their contributions in 1955 to the first successful demonstration of the reality of the antiproton. Both are members of the physics staff at the University of California's Lawrence Radiation Laboratory, although Dr. Chamberlain is currently at Harvard University as a visiting lecturer. A long-postulated necessity in nuclear theory, the search for the antiproton was delayed for many years for lack of means to accelerate protons to the very high energies required for antiproton production. One of the original suppositions in planning for the Berkeley Bevatron, in fact, was that its projected 6.2 billion electron volts would prove more than adequate for the production of proton-antiproton pairs, and it was hoped, in spite of the short lifetime which the scarce new particle was

SPACE TECHNOLOGY LABORATORIES, INC.

FELLOWSHIPS

FOR

Doctoral & Postdoctoral Study

AT THE CALIFORNIA INSTITUTE OF TECHNOLOGY
OR THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

1960
1961

EMPHASIS IN
THE STUDY PROGRAM
WILL BE ON
Systems Engineering

SPACE TECHNOLOGY Fellowships have been established in recognition of the great scarcity of scientists and engineers who have the very special qualifications required for work in Systems Engineering, and of the rapidly increasing national need for such individuals. Recipients of these Fellowships will have an opportunity to pursue a broad course of graduate study in the fundamental mathematics, physics, and engineering required for careers in these fields, and will also have an opportunity to associate and work with experienced engineers and scientists.

Systems Engineering encompasses difficult advanced design problems of the type which involve interactions, compromises, and a high degree of optimization between portions of complex complete systems. This includes taking into account the characteristics of human beings who must operate and otherwise interact with the systems.

The program for each Fellow covers approximately a twelve-month period, part of which is spent at Space Technology Laboratories, and the remainder at the California Institute of Technology or the Massachusetts Institute of Technology working toward the Doctor's degree, or in post-doctoral study. Fellows in good

standing may apply for renewal of the Fellowship for a second year.

ELIGIBILITY The general requirements for eligibility are that the candidate be an American citizen who has completed one or more years of graduate study in mathematics, engineering or science before July, 1960. The Fellowships will also be open to persons who have already received a Doctor's degree and who wish to undertake an additional year of study focused specifically on Systems Engineering.

AWARDS The awards for each Fellowship granted will consist of three portions. The first will be an educational grant disbursed through the Institute attended of not less than \$2,000, with possible upward adjustment for candidates with family responsibilities. The second portion will be the salary paid to the Fellow for summer and part-time work at Space Technology Laboratories. The salary will depend upon his age and experience and the amount of time worked, but will normally be approximately \$2,000. The third portion will be a grant of \$2,100 to the school to cover tuition and research expenses.

APPLICATION PROCEDURE For a descriptive booklet and application forms, write to Space Technology Laboratories Fellowship Committee. Completed applications together with reference forms and a transcript of undergraduate and graduate courses and grades must be transmitted to the Committee not later than Jan. 20, 1960.

SPACE
TECHNOLOGY
LABORATORIES, INC.

P.O. BOX 95004

LOS ANGELES 45, CALIFORNIA





E. Segrè (left) and O. Chamberlain (right), joint winners of the Nobel Prize in physics.

expected to have, that suitable techniques could be developed for its detection.

The Bevatron experiment involved the bombardment of a copper target with 6.2 Bev protons, in which the resulting proton-neutron collision led not only to the emission of those two particles but also to the creation of two new particles, a proton and an antiproton, born of the conversion into mass of part of the original bombarding proton's energy. To demonstrate that such a reaction had actually taken place, it was necessary to identify the antiproton beyond dispute. The two essential characteristics of the postulated particle had to be a mass equal to that of a proton and a negative charge. Since particles of opposite charge are automatically separated by the Bevatron magnet, it was quickly established that the new particle had the necessary negative charge, but the matter of mass determination was more troublesome.

Segrè and Chamberlain, together with Clyde Wiegand and Thomas Ypsilantis, planned and carried out the experiment with the help of Herbert Steiner and with the cooperation of Edward Lofgren, the latter being in charge of the Bevatron. Since the mass could not be measured directly, it was necessary to determine the momentum and the velocity of the particles to permit an indirect determination of mass. The momentum was found by bending the particles twice in magnetic fields and observing their degree of curvature. Two techniques were employed in finding the velocity, of which the first involved measurement of the antiproton's time of flight over a known distance between two counters and the second required the development of an improved Čerenkov counter and photomultiplier tube assembly for measuring the angular distribution of the emitted light generated by the intruding particle. Both experiments gave velocity measurements coinciding with theoretical estimates of the antiproton velocity.

As one of Enrico Fermi's collaborators in Rome during the early 1930's, Dr. Segrè took part in the pioneering experiments on artificial radioactivity which involved the methodical neutron bombardment of all of

the elements then known. These studies led to the discovery of slow neutrons and neutron diffraction and represent the beginnings of neutron physics as a field of research. Born in Tivoli, Segrè received his doctorate at the University of Rome in 1928 and served as a member of that University's physics faculty until 1935, when he went to the University of Palermo as chairman of the Physics Department. He left Italy in 1938 to join the University of California Radiation Laboratory, where he remained until 1943 when he went to Los Alamos, N. M., as a staff member of the laboratory operated by the University for the wartime Manhattan Engineering District of the Army. He returned to the Berkeley campus after the war as professor of physics. Dr. Chamberlain, a native of San Francisco, also took part in the Manhattan District project, first at Berkeley, where he was doing his graduate work in physics, and later at Los Alamos. After receiving his PhD from the University of Chicago in 1948, Chamberlain returned to Berkeley and is now professor of physics at the University. Both Chamberlain and Segrè are fellows of the American Physical Society.

The 1959 Franklin Medal, highest award of the Franklin Institute of Philadelphia, was presented on October 21 to Hans A. Bethe, John Wendell Anderson Professor of Physics at Cornell University, for his "many profound investigations which have contributed significantly to our understanding of the physical universe from nuclei of atoms to the interior of the stars". The Medal, which was awarded for the first time in 1915, is presented annually "to those workers in physical science or technology, without regard to country, whose efforts, in the opinion of the Institute, have done most to advance a knowledge of physical science or its applications". The presentation was made as a part of the Institute's annual Medal Day ceremonies.

In announcing the award, the Franklin Institute called particular attention to four examples of Bethe's many contributions to nuclear theory: his work with Heitler in the early thirties concerning the creation of



Franklin Medallist H. A. Bethe

electron-positron pairs, his theoretical description of the carbon cycle reaction as a mechanism to explain the phenomenon of stellar energy production, his quantum mechanical calculation of the stopping power of matter for fast charged particles, and his explanation of the electromagnetic shift of hydrogen energy levels.

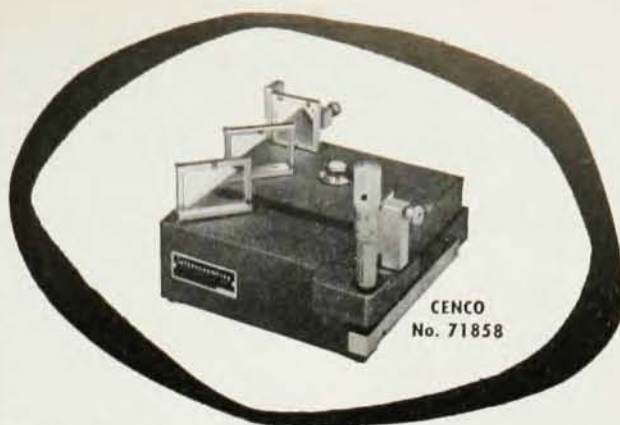
Born in Alsace-Lorraine, Dr. Bethe was educated at Kiel and Frankfurt and received his PhD from the University of Munich. He taught at various German universities until 1933 when he left Germany. He spent two years in England at the Universities of Manchester and Bristol before coming to the United States to join the Cornell faculty in 1935. During World War II, he took an extended leave of absence from Cornell while serving as leader of the Theoretical Physics Division at the wartime Los Alamos laboratory. A fellow and former president (1954) of the American Physical Society, Dr. Bethe has been a post-war consultant to the Atomic Energy Commission and a member of the President's Scientific Advisory Committee.

Grants and Fellowships

The Virginia Institute for Scientific Research in Richmond has received a \$75 000 grant to help underwrite two research scholars for three years of uncommitted, fundamental research. The award, which the Institute must match with gifts from other sources, was made by the Old Dominion Foundation. The Institute is a nonprofit corporation started in 1949 under the sponsorship of the Virginia Academy of Sciences. Its work has been primarily in the fields of surface chemistry and physics, the solid state, and plant biochemistry.

The Massachusetts Institute of Technology has established a new program of predoctoral fellowships in the atmospheric sciences (meteorology) and oceanography. The first awards under the program, which is made possible by a grant from the Ford Foundation, will be for the 1960-61 academic year. Fellowships will be awarded on the basis of the extent and quality of the applicant's preparation in the physical sciences and mathematics, his over-all academic record, the nature of references, his scientific objectives, and (when available) results of the Graduate Record Examinations, but prior training in the specific fellowship fields is not a prerequisite. The stipend is \$3000 per year plus full tuition and fellowships may be renewed for a maximum of three years. February 1 is the deadline for filing applications, which may be obtained along with further information from Prof. Henry G. Houghton, Room 24-516, Massachusetts Institute of Technology, Cambridge 39, Mass.

Harvard University has also received a Ford Foundation grant to support a doctoral-level fellowship program in problems of atmospheric physics. Theses can be submitted for degrees in physics, applied physics, or applied mathematics and the only stipulation is that the area of research must fall within some branch



NOW! a low cost Michelson INTERFEROMETER

This precision instrument is ingeniously designed to provide .2% accuracy at minimum cost. Directly calibrated in inches. Clear, well defined fringes are observable and measurable. Refractive properties of transparent materials can be easily studied. Sturdily constructed for classroom or laboratory research.

Complete with monochromatic mercury light and illustrated experiment manual . . . only \$209.95



CENTRAL SCIENTIFIC CO.

A Subsidiary of Cenco Instruments Corporation
1718-B Irving Park Road • Chicago 13, Illinois
Branches and Warehouses—Mountainside, N. J.
Boston • Birmingham • Santa Clara • Los Angeles • Tulsa
Houston • Toronto • Montreal • Vancouver • Ottawa

PHYSICISTS AND RESEARCH ENGINEERS

THE RADIATION LABORATORY OF
THE JOHNS HOPKINS UNIVERSITY
HAS POSITIONS FOR PHYSICISTS
OR RESEARCH ENGINEERS
IN THE FIELD OF:

MICROWAVE PARAMETRIC PHENOMENA

THIS UNIVERSITY LABORATORY OFFERS A VARIETY OF INTERESTING PROBLEMS IN FUNDAMENTAL RESEARCH FOR QUALIFIED PERSONS WITH ADVANCED DEGREES CAPABLE OF INDEPENDENT AND CREATIVE EFFORT

- Favorable Arrangements for Doctoral and Post Doctoral Study in the University Graduate Schools
- Faculty Privileges for Senior Staff
- Excellent Laboratory Facilities Located Near the University Campus
- Broad Opportunities for Personal Development

ADDRESS INQUIRIES TO:
RADIATION LABORATORY
THE JOHNS HOPKINS UNIVERSITY
Homewood Campus, Baltimore 18, Md.