

uranium contents of Essonville granite which is a part of a large continental rock called the Canadian Shield. The tests indicated that about 95% of the uranium present in the rocks is contained in minerals totalling less than half of one percent of the total mass of the rock.

IRE Honors Shockley

Work Leading to Transistors Cited

William Shockley, research physicist at the Bell Telephone Laboratories, will receive the 1952 Morris Liebmann Memorial Prize of the Institute of Radio Engineers "in recognition of his contributions to the creation and development of the transistor" during the IRE's national convention in New York City, March 3-6, it has been announced. The Prize carries a monetary award of varying amount, derived from the income of a \$10,000 endowment fund donated to the Institute more than thirty years ago by E. J. Simon in memory of Colonel Liebmann, whose life was lost during World War I. It is given annually to a member of the IRE who, in the opinion of the Institute's board of directors and upon the recommendation of the awards committee, shall have made an important contribution to the radio art.

Born in London, England, Dr. Shockley is a graduate of the California Institute of Technology and received his doctorate in physics at the Massachusetts Institute of Technology in 1936. From then until 1942 he was a member of the technical staff at Bell Labs. During World War II he directed a group at Columbia University which was concerned with antisubmarine warfare operations research, and he later served as an expert consultant to the Office of the Secretary of War. He returned to Bell Labs in 1945.

Dr. Shockley's work in the theory of solids, and particularly in the field of semiconductor physics, has played a large part in the invention and development of the transistor, a miniature amplifying device having as its essential ingredient a small amount of the element germanium. A semiconducting crystal triode, the transistor operates on very little power, is small in size, has no vacuum, glass envelope, nor heating element to cause a warm-up delay, and can be used as an amplifier or to satisfy many of the other functions usually associated with the vacuum tube. The original "point contact" transistor was created about four years ago by two other Bell Labs physicists, John Bardeen and Walter H. Brattain, under a research program initiated and directed by Dr. Shockley. Since that time, numerous refinements have been made in transistor design and a number of specialized types have been developed.

The most recent addition to the transistor family, the "junction" transistor, was announced last July by Bell Labs when it was stated that Dr. Shockley had developed an entirely new and improved transistor of a type which he had predicted theoretically two years earlier. This version, considerably smaller than the point contact type, is described as being extremely

William Shockley, recipient of this year's IRE Morris Liebmann Prize for his work in transistor physics. A Bell Labs physicist, Shockley is the author of *Electrons and Holes in Semiconductors*. D. Van Nostrand Company, Inc., 1950.



efficient and rugged. Constructed in the form of a small bead "about half the size of a pea", the junction transistor has no contact points, which in the original model corresponded to the terminals of a vacuum tube. Instead, it consists of a tiny rod-shaped piece of germanium, treated so that it embodies a thin electrically positive layer sandwiched between the two electrically negative ends. The rod is encased in a hard plastic bead about $\frac{3}{16}$ of an inch in diameter, with wire leads connected to each of the three regions and extended outside. The entire device occupies only about $\frac{1}{4000}$ of a cubic inch, whereas even a sub-miniature vacuum tube takes up about $\frac{1}{8}$ of a cubic inch. Perhaps even more important, the junction transistor consumes far less power than the point contact type (which itself operates on less power than an ordinary flashlight bulb) and requires only about a millionth of the power of a miniature vacuum tube.

Standard Isotope Samples

P³² and I¹³¹ Solutions Added to NBS List

Standard solutions of phosphorus-32 and iodine-131 are now included among the radioactive standards distributed or calibrated by the National Bureau of Standards for the benefit of investigators in physics, chemistry, medicine, and industry. These particular isotopes have been employed extensively for diagnosis and therapy in brain surgery, leukemia and other types of cancer, and in their early use, variations in the results obtained by different laboratories are said to have amounted to as much as 200 percent of the accepted value. The Bureau's new procedure for making the standard samples available to research workers will now permit the duplication of results at different laboratories.

The P³² and I¹³¹ standards consist of flame-sealed glass ampoules, each of which contains the active iso-

tope in approximately 3 milliliters of dilute carrier solution. The exact disintegration rate per milliliter as of the zero date is noted and is roughly 10^5 dps/ml. Because of their low activity, the standards are exempt from Federal regulations regarding the possession, use, and transfer of radioactive materials.

Other NBS standards include radium gamma ray solution standards, radium solution for radon calibrations, radium D + E beta ray standards, calibrated radioactive ore samples, cobalt-60 beta and gamma ray solution standards, carbon-14 beta ray solution standards, and neutron flux standards. A complete price list, with directions for ordering, can be obtained upon request from the Radioactivity Section, National Bureau of Standards, Washington 25, D. C.

Deadline in April

Cenco Offers Two Scholarships

Central Scientific Company has announced that it will award two graduate scholarships in the physical and engineering sciences for the academic year 1952-53. A scholarship at the master's level will carry a stipend of \$1000, and the second, at the doctor's level, will provide \$1500. Students who are citizens of the United States may apply in writing, giving college records and other personal data, the name of the school where work will be done, and details concerning courses to be taken and research problems contemplated. Applications and letters of recommendation should be addressed to the Scholarship Committee, Central Scientific Company, 1700 Irving Park Road, Chicago 13, Illinois. They should be mailed not later than April 15, 1952. Successful candidates will be notified before June 1.

Sylvania Center

New Laboratory Planned

Sylvania Electric Products Inc. has announced plans for a new metallurgical laboratory at Sylvania Center, the company's 57-acre research site at Bayside, Long Island, New York. The new laboratory will be devoted largely to metallurgical research for the Atomic Energy Commission and to other government work. The building, second new research facility to be built at the Bayside tract, will be of brick and steel construction and will follow closely the design of the 35,000-square-foot physics laboratory opened at Sylvania Center in 1949.

New Accelerator

Carnegie Tech's Synchrocyclotron

After nearly four years spent on construction, the Carnegie Institute of Technology has announced the completion of its two and one-half million dollar synchrocyclotron. The machine is now in operation and has produced protons at the 400 Mev level for which it was designed. Originally intended to operate at about half of its present energy, the accelerator was enlarged during the design state when it was discovered that

higher energies would be required for meson production experiments. Financial support was provided in part by a gift from the Buhl Foundation and the remainder through contracts with the Office of Naval Research and the Atomic Energy Commission. The instrument will serve the research needs of scientists connected with Carnegie Tech's Nuclear Research Center at Saxonburg, Pennsylvania.

Radiological Physics

AEC Fellowships for 1952-53

The Oak Ridge Institute of Nuclear Studies is currently receiving applications for Atomic Energy Commission graduate fellowships in radiological physics for the 1952-53 school year. The fellowships, the final three months of which will be spent at Oak Ridge National Laboratory, are awarded for study at two training centers: one at the University of Rochester in cooperation with Brookhaven National Laboratory, and the other at Vanderbilt University in cooperation with ORNL. An annual basic stipend of \$1500 is provided, with an additional \$500 for a wife and \$250 for each of two dependent children, making a maximum of \$2500 annually. University tuition and fees will be paid by the Institute of Nuclear Studies. Applicants must hold an undergraduate degree at the start of the fellowship period, preferably with a major in physics, chemistry, or engineering and a minor in mathematics, biophysics, or similar field. Fellows must be citizens of the United States and must receive security clearance in accordance with existing laws. Application blanks and additional information may be obtained from the heads of science and engineering departments of colleges and universities or from the University Relations Division, Oak Ridge Institute of Nuclear Studies, P.O. Box 117, Oak Ridge, Tennessee. Applications must be in the hands of the Institute by March 1, 1952.

Noise—Wanted and Unwanted

Michigan Offers Special Course

An inservice training course on the acoustical spectrum is to be offered by the University of Michigan School of Public Health, in collaboration with the Institute of Industrial Health, from February 5th to 8th. Designed particularly to serve public and industrial health and safety personnel as well as others interested in both the desirable and undesirable effects of noise in the human environment, the intensive four-day course will cover sound and its behavior, the measurement of sound, ultrasonics, mechanical vibration, biophysics of sound perception, the pathological and emotional effects of sound, and the principles and methods of sound control. The Acoustical Society of America is well represented on the list of speakers. An enrollment fee of \$10 has been set and applications should be submitted to H. E. Miller, School of Public Health, the University of Michigan, Ann Arbor, Michigan.