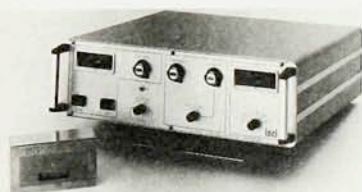


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people to use them as an example. "We as a nation cannot rest on our laurels in this vital area of concern, and American young people need to know that their well-being depends on our continued progress in science and technology," he said.

Among the twelve winners this year are four physicists—Philip W. Anderson, of Princeton University and Bell Labs; Yoichiro Nambu, of the Enrico Fermi Institute at the University of Chicago; Edward Teller, of the Hoover Institution on War, Revolution and Peace at Stanford University; and Charles H. Townes, of the University of California, Berkeley.

Anderson was cited "for his fundamental and comprehensive contributions to the theoretical understanding of condensed matter, most notably his work on electron localization in highly disordered solids and the nature of localized magnetic states in metals."

Nambu was recognized "for his se-

minal contributions to the understanding of elementary particles and their interactions."

Teller was noted "for his outstanding contributions to molecular physics, understanding the origin of stellar energy, the theory and application of fusion reactions, the field of nuclear safety, and for his continued leadership in science and technology."

Townes was honored "for fundamental contributions to the understanding of matter through its interaction with electromagnetic radiation and the application of this knowledge to the service of mankind, most notably in leading to the invention of the maser and the laser."

The National Medal of Science was established by Congress in 1959, authorizing the President to choose medalists in recognition of outstanding contributions to knowledge in the physical, biological, mathematical, engineering, behavioral or social sciences.

obituaries

Frederick E. Terman

Frederick E. Terman, emeritus provost of Stanford University and commonly credited with being the academic architect of Silicon Valley, died at his campus home on 19 December 1982. Born in English, Indiana, 7 June 1900, he was the son of Lewis M. Terman, the psychologist who developed the Stanford-Binet Intelligence Quotient. Frederick Terman displayed an early interest in radio. Two years after he graduated from Stanford—at age 20 with a bachelor's degree in chemical engineering—he received an engineer's degree in electrical engineering under Harris J. Ryan, widely regarded as the first professor of electrical engineering in the US. Terman earned his doctorate in 1924 at MIT under Vannevar Bush. He accepted a teaching position at Stanford, but was stricken with tuberculosis. During a year's convalescence he taught part-time and began the first of a series of textbooks on radio engineering. In 1926 he started teaching full-time.

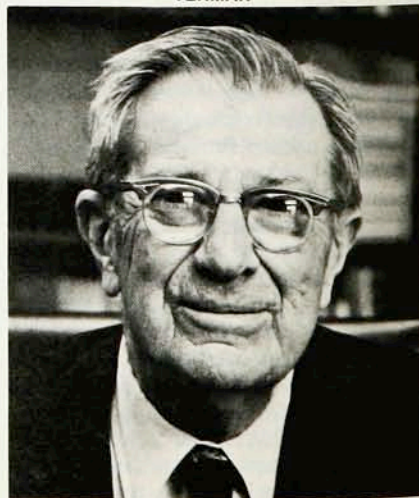
He continued to work hard at developing courses and writing textbooks, whose success enhanced Stanford's reputation. He became a full professor and head of the department of electrical engineering in 1937. Four years later he was elected president of the Institute of Radio Engineers.

The Electronics Laboratory at Stanford in that prewar period was an attic with a leaking roof. Even under those conditions, Terman was able to attract and influence the careers of a number

of engineers who later came to have a great impact on electronics in this country. Among his students were William Hewlett and David Packard. At Terman's recommendation, another student, Edward Ginzton, began to do research with William Hansen of Stanford. Their continuing collaboration was a key element in the postwar development of linear accelerators, both for high-energy physics and for clinical applications.

When the War broke out, Vannevar Bush asked Terman to organize a radio research laboratory in Cambridge, Massachusetts, to develop radar countermeasures. Terman recruited more than 800 people to work on radar jammers, search receivers, and such ideas as "chaff" for jamming. During his first winter there Terman also

TERMAN



completed one of his best-known books, *The Radio Engineers Handbook*, often considered the Bible of its field.

As a result of his wartime responsibilities Terman became part of a relatively small group of individuals who exerted great influence on US science policy in the postwar period.

In 1946 he returned to Stanford as Dean of Engineering and began a program of faculty selection and organizational leadership that brought the Stanford School of Engineering to the forefront among US universities. He became provost of the University in 1955 and from 1959 served also as its vice president until his retirement in 1965. His support was very important in the establishment of a major new scientific institution at Stanford—SLAC—which has made many outstanding contributions to physics.

MARVIN CHODOROW
Stanford University

James Sircom Allen

James Sircom Allen, pioneer nuclear physicist and professor emeritus at the University of Illinois at Urbana-Champaign, died on 15 September 1982. He was 71 years old. He was well known for helping to establish that neutrinos are emitted in beta decay and for providing decisive evidence for the nature of beta decay.

Born in Halifax, Nova Scotia, he attended the University of Cincinnati, where he earned his BA in 1933. He did his graduate work in physics at the University of Chicago, working with S. K. Allison on the breakup of light nuclei by 300-kV protons. He received his PhD in 1937 and continued exploring nuclear reactions with John Williams at the University of Minnesota as a research associate 1937–1939. It was here that he made his first innovative contributions to special instrumentation for nuclear accelerators and detectors; among these was the study of secondary electrons from metals and the development of the secondary-electron multiplier as detector for positive ions, electrons and photons. From Minnesota he went to Kansas State College as associate professor of physics 1939–1942. Here, with only the most elementary facilities, he designed and carried out the well-known experiment in which he determined the momentum of the neutrino associated with capture of an electron from the K shell of Be⁷ by use of the energy of the recoiling Li⁷.

During the war he worked first on the development of radar at the Radiation Laboratory 1942–43 and then at Los Alamos, where he contributed to the developments, interpretation and application of gaseous particle detectors and electron multipliers. After the war he returned to the University of

Chicago. His measurements of the energy distribution of nuclear recoils and the correlation with the direction of emitted electrons helped in deciding among possible types of weak interaction involved in beta decay.

Allen continued his work on this weak interaction puzzle after coming to the University of Illinois in 1948. Here, with the assistance of several graduate students, he obtained the clearest evidence that the vector and axial vector interactions were the basic interactions involved in beta decay. To revitalize the old cyclotron in his charge, he and his assistants restructured the magnetic field using the new strong focusing principles; the renovated machine continued to provide the basis for experiments in nuclear physics for another decade.

Allen was much appreciated by his graduate students, who shared with him the joy of doing meaningful experiments well and successfully.

A. O. HANSON
R. O. SIMMONS
University of Illinois
Urbana-Champaign

Jean-Denis Carette

Jean-Denis Carette, professor of physics at Université Laval, died after a brief illness on 29 March 1983. At 52, he was in a period of intense activity in the research groups that he had helped found, notably the Centre de Recherches sur les Atomes et les Molécules and a new laboratory dedicated to the physical chemistry of surfaces.

Born at St-Zacharie de Beauce, he studied engineering physics at Laval, doing graduate work under the direction of Larkin Kerwin. His early interests were in mass spectrometry and electron optics, in particular, electron-atom collisions. With time, his interests turned gradually to the use of electron beams for surface studies. His very-high-resolution work with low-energy electrons led to his most significant contribution, the discovery that surface resonances can show up as fine structure in the current variations of slow electrons diffracted by a single-crystal metallic surface. These studies generated much interest and stimulated further theoretical as well as experimental work at various laboratories in several countries. His work on secondary emission from semiconducting surfaces led to four patented applications. He served on several national committees of the National Research Council of Canada and was chairman of both the Surface Science and the Atomic and Molecular Physics Divisions of the Canadian Association of Physicists.

DENIS ROY
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