MEMORIAL RESOLUTION
MARVIN CHODOROW

(1913-2005)

Marvin Chodorow, the retired Barbara Kimball Browning Professor of Applied Physics and Electrical Engineering, whose academic leadership led to the founding of the Department of Applied Physics and whose research was instrumental in the building of linear accelerators and other microwave instruments, died peacefully in his campus home on October 17, 2005 at the age of 92.

Marvin was born in Buffalo, New York on July 16, 1913, and he grew up there as an only child in a warm, extended Jewish family. His parents Lena and Isadore had emigrated from the Ukraine in 1905. His father was a cabinetmaker. Marvin graduated with a degree in physics from the University of Buffalo, then continued at MIT where he completed his doctorate in theoretical physics under the noted solid-state physicist John Slater in 1939. His pioneering work on "A General Method of Calculating the Energy Bands of Crystals with Particular Application to Metallic Copper" is still cited in the literature as the "Chodorow potential" 60 years later. Even after he moved into other fields, he took great pleasure in being recognized for that, and in turn generously acknowledged the help of Conyers Herring, then at MIT and now an emeritus professor of Applied Physics at Stanford. After a brief time at Pennsylvania State, Marvin became an instructor in Physics at CCNY. In late 1940, as World War II broke out in Europe and American involvement came to be seen as inevitable, most of the early klystron research group at Stanford, including Professor W. W. Hansen, the Varian brothers, and research associate Edward L. Ginzton moved to the Sperry Gyroscope Company in Garden City, New York. Marvin joined this group in 1943 to work on early radar developments. With his theoretical physics training, he soon became an expert in the new field of microwaves, a change of direction he considered to be the "single most important event in my (scientific) life".

After the war, Marvin followed Hansen and Ginzton to Stanford in 1947 as an assistant Professor of Physics. At Hansen's and Frederick Terman's urging, the Stanford Trustees had approved the formation of an interdisciplinary Microwave Research Laboratory to exploit the scientific and engineering advances made possible by the Varian brothers' klystron. One of the Laboratory's primary aims was to increase the power of the klystron amplifier by the factor of 1000 needed to realize Hansen's vision of a linear electronic accelerator, a new research tool that would be capable of reaching electron energies well beyond the state of the art at that time. Marvin soon extended klystron theory to include the relativistic corrections needed for describing electron beams that were accelerated to hundreds of thousands of volts. In a seminal paper coauthored with Ginzton, Ivan Neilsen, John Jasberg and John Shaw the foundation was laid for the design of the high powered klystrons used for the initial Mark III accelerator and then later used to build the klystrons for the two mile long linear accelerator at SLAC. Subsequent Chodorow inventions led to other high power tubes and devices incorporated in advanced radar systems.

Hansen remained the director of the Microwave Research Laboratory until his untimely death in 1949. Marvin and Ed Ginzton then continued the project in a collaboration, notorious for their continuous but friendly disagreements. Marvin, the physicist, always wanted to get more basic data while Ed remained ever conscious that it was time to get started even if things were not optimum. Marvin once said that their only unresolved dispute was the setting on the thermostat that controlled the common heating unit of both offices. Under Ed Ginzton's leadership, the Mark III accelerator, the world's first large electron accelerator, was completed and then used by Robert Hofstader in investigations that led to Hofstader's receiving Stanford's second Nobel Prize in physics.

Through the continuing efforts of Chodorow, Ginzton, Karl Spanngenberg, Lester M. Field, and later Dean A. Watkins, Hubert Heffner, Donald Dunn and others, Stanford soon became the preeminent university center of microwave tube research. Marvin developed and taught a course in the subject and educated many students who went on to become leaders in the field. Included among them is the current president of the Stanford Board of Trustees, Burt McMurtry, who remembers Marvin occasionally getting hopelessly entangled in a complicated derivation and turning to his students for help. An influential text, "Fundamentals of Microwave Electronics," which Marvin and Charles Susskind from UC Berkeley coauthored, has been used by students around the world. Marvin had great physical intuition and could figure out how electron beams would behave under complicated circumstances. He was inspirational and enthusiastic and generous with his students.

Following the 1953 arrival of Wolfgang K.H. Panofsky at Stanford, Ginzton and Panofsky created the umbrella W.W. Hansen Laboratories of Physics under which the original Microwave Research Laboratory was separated into a High Energy Physics Laboratory to continue development and operation of several linear accelerators and a new Microwave Laboratory to continue development of microwave tubes and other applications of microwave technology. Marvin Chodorow became director of this new Microwave Laboratory in 1959 when Ginzton left Stanford to head Varian Associates following the sudden death of Russell Varian. During his subsequent 19 years as director, Marvin made major contributions to the development of science and engineering at Stanford, particularly through his sensing the opening of golden ages in condensed matter science, and in optics, atomic and plasma physics. He recognized the necessity of making new appointments in physics and engineering in order to realize these opportunities. For various reasons the physics department was not eager to expand beyond one appointment, though Chodorow's initial search had identified two outstanding candidates from Bell Laboratories, Arthur Schawlow and Calvin Quate. Partly in order to avoid making a choice, Marvin obtained support from Provost Professor Fred Terman and Dean of the Graduate School AI Bowker to form a new Division of Applied Physics in 1962. Schawlow was appointed Professor of Physics, and Quate Professor of Applied Physics in the Division. Marvin continued to attract outstanding faculty to the new Division who worked in different disciplines yet supported each other across a range of expertise. He created a laboratory where students from various departments including Physics, Chemistry and Materials Science could interact at the coffee break, at lunch and throughout the day. The stimulating environment provided by this grouping of faculty and students from different areas working on evolving technologies is an early realization of the merits of multidisciplinary research. Federal support for the basic research activity generated substantial overhead payments that underwrote the Laboratory costs to the University. Marvin was fond of saying the lab was a 'money maker' for Stanford.

He was able to retain some of these funds, enough to attract faculty from other departments by offering space and research monies. The research programs that thrived extended across technical areas including acoustics, optics and quantum electronics and solid state physics, particularly superconductivity. He took a special interest in the area of acoustics and promoted several projects from which research came devices such as acousto-optic modulators and the Acoustic Microscope. In 1968 the Applied Physics Division became a Department in the School of Humanities and Sciences, with Marvin serving as the first chair while continuing as head of the Microwave Laboratory. In 1976, at the dedication of the Applied Physics Building, the Laboratory was renamed the Edward L. Ginzton Laboratory in recognition of Ginzton's major contributions, and the fact that microwave was no longer an appropriate description of the ongoing research.

Marvin's broad interests throughout his life ranged over the intellectual landscape far outside of science and he developed a wide circle of friends across the entire university. This led to his contributing to the university in many ways over the almost four decades of his active Stanford career. As a member of the Academic Senate he served as the Chair of the Committee on Committees, and the Committee on Graduate Studies. He also participated in the Faculty Committee on University Publications, the President's Committee on Athletics, the SES Committee on Extra Curricular Activities (chair), the Ad Hoc Committee on Undergraduate Writing, the Committee on Seminars of Entering Students (director), the Advisory Committee for the Drama Department, the Public Lectures Committee, and the Humanities and Sciences Committee on Policy. At his faculty retirement celebration, then-athletic director Joe Ruiz noted that if the ceremony had been scheduled one week later Marvin wouldn't have been able to attend because of conflict with the football game. Marvin was elected to both the National Academy of Engineering (1967) and the National Academy of Sciences (1971) as well as the American Academy of Arts and Sciences (1972). He also served on many national and international advisory committees and delegations. He was a member of the American Association for the Advancements of Science, the American Association of University Professors, and a Fellow for the American Physical Society and the IEEE. Marvin was a lecturer at Ecole Normale Superior, Paris, a Fulbright Fellow at Cambridge, and a long time consultant at Varian Associates. The Varian focus on medical devices and instruments began in the early days of the Microwave Laboratory when Henry Kaplan, then head of Radiology in the Stanford Medical Center, requested a high-powered X-ray source for treating cancer. The linear accelerator-based-X-ray source that Ed Ginzton, Marvin, and their associates at Varian developed to treat human patients, first used in a crude vault underneath the Microwave Laboratory, and later at the Stanford Hospital, marked the birth of modern radiation technology. It was the prototype for some 4,000 Varian "Clinac" sources currently in operation around the world.

Marvin married Leah Ruth Turitz during his graduate school days in 1937. They enjoyed 67 years of marriage together until Marvin's death. During one of their many trips together in June of 1972, Leah received the Radcliffe Alumnae Association Award from her alma mater in Cambridge, and Marvin received an honorary Doctor of Laws degree from the University of Glasgow. Marvin and Leah were famous for the warmth of their home. Marvin's many colleagues and friends have fond memories of the Chodorows' hospitality, delicious dinners with far-ranging conversations, and the humor with which Marvin and Leah engaged life. Marvin had an almost child-like curiosity, treating books and articles from all over as new toys to be discovered. His study was always overflowing, as was his life. He will be happily remembered and greatly missed, by us and by many others at Stanford and elsewhere.

Marvin Chodorow is survived by his Leah, his daughters Nancy and Joan, and two grandchildren, Rachel and Gabriel.

Committee:
Theodore Geballe