thesis in 1950.

The advent of polarized nucleon beams at the 184-inch synchrocyclotron in 1953 opened an intensive program of nucleon–nucleon scattering experiments, which turned into the major activity of our research group during the following few years. Wiegand played a key role in this work and provided much of the technical leadership.

After the antiproton discovery, Wiegand and colleagues turned their attention to measuring the interaction cross sections of these particles. In 1957, he spent six months at CERN, the European laboratory for particle physics near Geneva, where he set up electronic systems that were of great value to the fledgling experimental program there. Wiegand and his colleagues then turned their attention to studying the pion–pion interaction, and later to measuring rare kaon decay modes.

Wiegand preferred to do interesting small-scale experiments, and in the 1970s he and a number of graduate students pioneered the study of K-mesonic atoms, a task that occupied him until his retirement. In all his experiments and research activities, he followed a straightforward approach to get to the heart of a problem and then used great skill and meticulous care to carry out the actual measurements.

Wiegand was a prolific technical innovator. In the late 1940s, he developed one of the first distributed amplifiers, a precursor of the kind of high-speed electronics widely used today in many fields of science and technology. He was among the first to realize the tremendous importance of coupling detection systems to computers. Though he officially retired in 1980, after 38 years at the Lawrence Berkeley National Laboratory, he continued to develop state-of-the-art electronic systems for x-ray and gamma-ray detectors used both in spacecraft and in terrestrial applications.

In sum, Wiegand was a master of his trade, who delighted in being confronted by experimental challenges, and who more often than not came up with innovative solutions to the problems at hand. He was a quiet, unassuming person who was always ready to help others and who had a profound influence on the scores of colleagues and students with whom he worked over the years.

Wiegand was a man of varied interests outside of physics. He traveled throughout the world shooting home movies and collecting footage from all seven continents. He hiked in the Himalayas and camped on both Mount Everest and K2, piloted his own plane, played the organ and was an avid ham radio operator. He loved listening to big band music, growing apricots and boysenberries (which he canned for family and friends), and watching Oakland Athletics baseball games.

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Kenneth Tompkins Bainbridge

Kenneth Tompkins Bainbridge, the George Vasmer Leverett Professor of Physics, Emeritus, at Harvard University, died in Lexington, Massachusetts, on 14 July 1996, just thirteen days before his 92nd birthday and two days before the 51st anniversary of the test explosion of the first nuclear bomb, which he had directed.

Born in Cooperstown, New York, Ken grew up in New York City. He started to experiment with radio transmission as a teenager. He was able to purchase surplus 5-watt radio tubes from the radio operators from naval vessels returning after World War I that were docking near his house on Riverside Drive.

In 1921, he gave up radio to enroll in a five-year combined SB and SM program in electrical engineering at MIT. Through a cooperative arrangement with the General Electric Co, he spent his summers in the GE research laboratories at Schenectady. His experience there led to his obtaining patents on cesium–oxygen–silver photoelectric cathodes and on electrodes for secondary emission. He had become especially interested in physics and was advised by his associates at GE that, if he wished to go further in physics, "Princeton was the place to go."

Kenneth Tompkins Bainbridge

As a graduate student at Princeton University, he became interested in nuclear physics, little of which had come into the regular course work by that time. He pursued his interest largely through reading the limited literature then available. He designed his first mass spectrograph to search for element 87, eka-cesium. Ken then spent some years as a postdoctoral fellow at the Bartol Research Foundation, where he continued to use his mass spectrographs to measure isotopic masses and to compare nuclear mass differences with the energies measured in transitions as a check on Einstein's mass–energy equivalence. He had become widely recognized as the designer of one of the most advanced mass spectrographs of that era.

From July 1933 to September 1934, Bainbridge visited the Cavendish Laboratory of Ernest Rutherford, where he became acquainted with the many distinguished nuclear physicists there. He entered into a lifelong friendship particularly with John D. Cockcroft. In 1934, Ken joined the physics department at Harvard University, where his former colleague from Bartol, J. Curry Street, was by then also employed. At Harvard, Ken continued his pursuit of mass spectroscopy of nuclear isotopes, but in 1936, with Street's collaboration, he undertook to build a cyclotron. Ernest O. Lawrence of the University of California at Berkeley helped by providing detailed drawings of his newest, 37-inch cyclotron. Ken's first graduate student, Edward M. Purcell, also joined in the development of the cyclotron. The instrument became operational well before the widespread disbandment of physics research at the start of World War II.

Prior to 1940, Ken had proposed a method of isotope separation using counter flow in a Holweck pump and had enlisted the collaboration of the chemists E. Bright Wilson and George B. Kistiakowski. When these three brought their work to the attention of the Navy in Washington, they were told to forget it, that classified work was under way and the situation was well in hand.

In September 1940, Ken was the first physicist to be recruited by Lawrence for the microwave "radio location" project that became the Radiation Laboratory at MIT. Ken's friendship with British scientists was an asset in this activity, which had begun in close collaboration with them. He oversaw the development of radars of increasing power, especially for the Navy. In the spring of 1941, he made a visit to Britain to observe and report on secret radar developments there, and learned, also, about British studies for nuclear energy.

In May 1943, after two and a half years at the MIT Radiation Laboratory, Ken was recruited to the nuclear weapons laboratory at Los Alamos. That same year, his Harvard cyclotron was requisitioned by the Manhattan Project of the US Army. It was dismantled and shipped to Los Alamos, where it became a working facility of the project.

At Los Alamos, Ken came to be in charge of preparing a facility and directing the first test explosion of a nuclear bomb, the "Trinity Test," at Alamogordo, New Mexico. After the successful test on 16 July 1945, Ken made his famous remark to the project leader, J. Robert Oppenheimer, "Now we are all sons of bitches." Years later, Oppenheimer told Ken's daughter Margaret, that Ken's utterance had been the best thing anyone had said after the test.

Returning to Harvard in 1945, Ken laid the plans to replace the cyclotron with a 96-inch synchro-cyclotron, and he also constructed a large mass spectrograph designed for precision mass measurements. Robert R. Wilson took over the cyclotron project, to be succeeded by Norman F. Ramsey. (That cyclotron still operates, providing the Massachusetts General Hospital with a facility for proton beam therapy.)

With his return to academic life, Ken devoted much time to developing an advanced teaching laboratory in nuclear physics. Many of the graduate students who arrived in greatly expanded numbers after the war were introduced to experimental nuclear physics in Ken's meticulously developed laboratory. In his research, Ken developed techniques to measure the very small changes in nuclear lifetimes against electron-capture transitions with different atomic states and with hydrostatic compression. Some of that work was carried out at Brookhaven National Laboratory during his summers and sabbatical leaves.

In all his work, Kenneth Bainbridge was extraordinarily thorough and was meticulous in his keeping of records, habits that enormously aided his successors in those projects. He took pains to see that credit and recognition were properly given for their accomplishments to his friends and colleagues. In the passing of Kenneth Bainbridge, the world has lost a stalwart pioneer in the development of 20th-century science.

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