# IN MEMORIAM

Owen Chamberlain
Professor of Physics, Emeritus
Berkeley
1920 — 2006

With the death of Owen Chamberlain at age 85 on February 28, 2006, the University of California, Lawrence Berkeley National Laboratory, and the wider world lost a great physicist and humanitarian. Best known for his discovery of the antiproton, for which he shared the 1959 Nobel Prize in physics with Emilio Segrè, he had a long career in groundbreaking experimental work in fundamental particle physics. He was a Fellow of the American Physical Society and a member of the U.S. National Academy of Sciences.

Ever unpretentious and approachable, he was 'Owen' to all who knew him. He transmitted his skills and knowledge to students and colleagues by example. He worked side- by- side with them at the accelerator caves into the wee hours carrying lead bricks for shielding, recording the data, and fixing whatever equipment needed fixing. He would use these occasions and other informal encounters to elucidate physics principles, concepts, and his reasoning in problem solving.

Owen was born in San Francisco on July 10, 1920, the son of Dr. W. Edward Chamberlain, a distinguished radiologist, and Genevieve Lucinda Owen. After the family's move to Philadelphia in 1930, Owen attended school there, including high school at Germantown Friends School, and then went on to Dartmouth. After his graduation in 1940 he was accepted as a graduate student in physics at the University of California, Berkeley. There he met Professor Emilio Segrè and fellow student Clyde Wiegand, who were to become close collaborators and friends.

Soon after the outbreak of World War II in December 1941, Ernest Lawrence persuaded Segrè to help with the development of a nuclear bomb at Los Alamos. Owen and Clyde followed him there and were present at Alamogordo when the first atomic bomb was detonated on July 19, 1945. Shortly after the end of WW II Owen went to the University of Chicago to obtain his Ph.D. under the direction of Enrico Fermi. In 1948, several months before submitting his thesis, he returned to UC Berkeley as a physics instructor. Advancing quickly through the ranks, by 1958 he had become a full professor at age 38.

Upon his return to Berkeley he joined with Segrè, Wiegand, and graduate student Tom Ypsilantis to initiate a program of proton- proton scattering experiments at the 184- inch synchrocyclotron designed to elucidate the nature of the nucleon- nucleon interaction. A crucial feature of this work was their pioneering use of beams of polarized protons. Thanks to his easy informality and extensive, deep understanding of physics, the many graduate students who participated in these experiments tended to go to Owen whenever they had questions or problems. He enjoyed interacting with students at all levels, and he was very good at it.

In 1954, the world's highest energy proton synchrotron, the Bevatron, was completed at Berkeley's Radiation Laboratory. Designed to accelerate protons to 6.3 GeV, it was able to produce antiprotons, particles that had been theoretically predicted but never seen. In an oral history completed in 2001 Owen recounts how he first became involved in the quest to discover the antiproton. He was spending the summer of 1954 at Brookhaven National Laboratory when he learned that Maurice Goldhaber had bet Hartland Snyder $500 that antiprotons did not exist. He says: “Well I have great respect for Maurice Goldhaber as a physicist, and I suspect he made the bet when he was a little drunk, but even when drunk Maurice Goldhaber is a good physicist. So if someone of the stature of Maurice thought that maybe antiprotons didn’t exist, then this was a real spur to showing that they did. And I think it was at this moment that I decided: ‘By Jove, this is what I want to do.’”

Owen and Clyde Wiegand spearheaded the effort, later joined by Segrè and Ypsilantis, to prepare an experiment to look for antiprotons. The main experimental challenge was to cleanly isolate and identify the extremely rare antiprotons from the much more copiously produced negative pions in the beam – typically 50,000 pions for every antiproton. In September 1955, after about a month of intermittent data taking, they were able to report the unambiguous observation of antiprotons. The Nobel Prize followed in 1959.

By 1960, Owen’s research interests shifted in a completely different direction. He embarked on a program to develop polarized proton targets for use in high- energy physics scattering experiments. Professors Carson Jeffries in Berkeley and Anatole Abragam in France had independently just developed the technique of dynamic nuclear polarization. Owen quickly grasped its potential for application in particle physics. He, Jeffries, postdoctoral fellow Gilbert Shapiro, graduate student Claude Schulz, and technical wizard Ray Fuzesy soon produced a working target that was then used to study the spin dependence of high- energy collision processes. Owen’s versatility as a physicist came to the fore as he successfully mastered new techniques that are not part of the daily routine of particle physicists. In short order he learned how to grow exotic crystals, make ultracold refrigeration systems, generate and transmit microwaves, develop radio frequency detection systems, and build large magnets with high field uniformity. It was a perfect match to his way of doing physics. Over the next 20 years he continued to lead a worldwide effort to improve the performance of polarized targets, and to use them in a wide variety of fundamental experiments. Programs were developed at major laboratories throughout the world. In Berkeley more than a dozen of his Ph.D. students submitted theses based on such experiments.

In the 1970s Owen moved to the emerging subject of high- energy heavy- ion collisions using the newly commissioned accelerator complex, the Bevalac, that joined the HIlac and Bevatron accelerators at the Lawrence Berkeley National Laboratory (LBNL). Owen was one of the few particle physicists to continue at the Bevalac long enough to help train the nuclear scientists from nonrelativistic low- energy fields in the techniques of Bevalac- energy physics. He was instrumental in launching a fruitful Japanese- American collaboration in pion and kaon production studies at the Bevalac.

In the 1980s he joined a group headed by David Nygren in developing a radically new particle detector, the “time projection chamber,” that was used in experiments at the Stanford Linear Accelerator Center. He continued with his physics research even after his retirement in 1989, until he was forced to slow down and finally to curtail his activities because of the ravages of Parkinson’s disease. He remained cheerful, continuing to attend the Department of Physics colloquia until a few weeks before he died.

Physics research was the prime focus of Owen’s life. At the same time he enjoyed teaching graduate and undergraduate physics courses, for physics majors and others. Many of his students went on to important physics careers of their own. He was a popular and beloved teacher; his cluttered small office was often too cramped during his office hours to accommodate the many students who came to learn from him. To remedy this situation the Department of Physics set up “Owen’s blackboard” in the hallway outside his office.

In 1943, he married Beatrice Babette Copper, who died in 1988. His second marriage was to June Steingart Greenfield, who died in 1991. He is survived by his third wife, Senta Pugh- Chamberlain (née Gaiser, widow of LBNL physicist Howell Pugh). He is also survived by four children from his first marriage: Karen Chamberlain of Tampa, Florida, Lynne Guenther of Ithaca, New York, Pia Chamberlain of San Jose, California, and Darol Chamberlain of Ithaca, New York, as well as stepdaughters Mary Pugh of Toronto, Canada, and Anne Pugh of Oakland, California.

Owen had a strong social conscience and fearlessly stood up for the causes he believed in. He actively championed human and civil rights, as an outspoken advocate for disarmament and peace, and in providing opportunities for the professional development of disadvantaged young people. His long- standing interest in slowing the arms race dates back to the end of WWII, when he became an early member of the Federation of American Scientists, and later a founding member of the Ploughshares Fund. He was one of the faculty leaders in promoting students' rights during the turbulent Free Speech Movement in Berkeley in the 1960s. He was the cofounder and long time cochairman of the Special Opportunities Scholarship (SOS) program to help talented but socially and economically deprived high school students to attend the University of California. He was an active participant in quite a different SOS program that was set up to ease the plight of Soviet colleagues Sakharov, Orlov, and Shcharanski. Owen was among the early opponents of U.S. involvement in Vietnam and often joined in the marches and protests against the war there. It was typical of Owen that in the late 1980s, when invited to Japan to give a series of public lectures, he insisted on visiting Hiroshima to offer his personal apologies in its Peace Memorial Park. He was a very special person who left a lasting imprint on those of us that had the privilege and the pleasure of knowing him.

John Rasmussen
William Chinowsky
Herbert Steiner