

obituaries

PHYSICS TODAY has changed the way it publishes obituaries. Some will continue to appear in print, but most will be available only online (see PHYSICS TODAY, October 2005, page 10). Subscribers can visit <http://www.physicstoday.org/obits> to notify the community about a colleague's death and submit obituaries up to 750 words, comments, or reminiscences. Each month, recently posted material will be summarized here, in print. Select online obituaries will later appear in print.

Owen Chamberlain

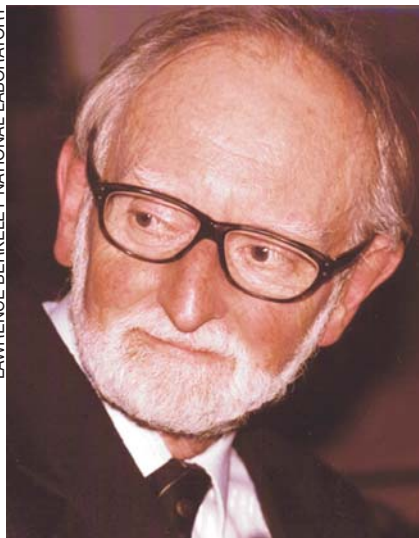
Owen Chamberlain, who shared the 1959 Nobel Prize in Physics with Emilio Segrè for the discovery of the antiproton, died of complications from Parkinson's disease at his home in Berkeley, California, on 28 February 2006. Owen, as he preferred to be addressed by students and colleagues alike, was not only an outstanding physicist but also a person who translated his deep concerns for peace and social justice into action.

Owen was born in San Francisco on 10 July 1920. After completing his undergraduate studies at Dartmouth College in 1941, he enrolled as a graduate student in physics at the University of California, Berkeley. Upon the entry of the US into World War II in December 1941, Ernest Lawrence sought to enlist Berkeley physics faculty and students to help with the Manhattan Project. Owen volunteered and was assigned to assist Emilio Segrè at the 60-inch cyclotron.

In the summer of 1943, Segrè and his group, including Owen, moved to Los Alamos, New Mexico, where they were assigned the task of determining the spontaneous fission probabilities of uranium and plutonium isotopes. Their initial results suggested an unexpectedly high rate of spontaneous fission, but later they determined that most of the "spontaneous" fission events were actually induced by cosmic rays. Nevertheless the rates were high enough to require a complete redesign of the bomb trigger. Owen was at the Trinity test site in Alamogordo, New Mexico, when the first atomic bomb exploded on 16 July 1945.

In March 1946, at the urging of Segrè, Owen left Los Alamos and followed Enrico Fermi to the University of Chicago to join what surely must rank as one of the most impressive groups of physics graduate students ever assembled in one department. Owen initially intended to study theoretical physics but soon switched to experiment, and under Fermi's direction he did his PhD

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Owen Chamberlain

thesis on the scattering of slow neutrons from liquids. Accepting appointment as an instructor in the physics department, he went back to Berkeley in the fall of 1948, even before submitting his thesis in 1949. Owen was to remain there, rising through the academic ranks as a popular and distinguished faculty member, until his retirement in 1989.

At Berkeley he again linked up with Segrè, and together they and their students engaged in a program of nucleon-nucleon scattering at the 184-inch synchrocyclotron at what was then called the Rad Lab. Another member of the group was Clyde Wiegand, who had also been a student of Segrè's at Berkeley and Los Alamos and who was a superb experimentalist with great skills in electronics. In 1948 Lawrence initiated the construction of the world's highest-energy proton synchrotron, the Bevatron. Its maximum energy of 6.3 GeV was chosen to make production of antiproton-proton pairs energetically possible, if indeed they existed. Owen and Clyde spearheaded an effort, later joined by Segrè and Thomas Ypsilantis, to prepare an experiment to look for antiprotons. They were not alone in that quest—several other groups at the Rad Lab and elsewhere were also actively planning antiproton

experiments. There was a palpable sense of competition, and more secrecy than one usually associates with open scientific inquiry.

Owen had first become interested in looking for antiprotons during a visit to Brookhaven National Laboratory in the summer of 1953. He thought that antiprotons must exist, but he was really turned on to the chase when he heard that Maurice Goldhaber had bet Hartland Snyder \$500 that they did not exist. In an oral history completed in 2000, Owen stated, "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 maybe antiprotons didn't exist, then this was a real spur to showing that they did. And I think it was at that moment that I decided: 'By Jove, this is what I want to do.'"

The experiment itself was simple and elegant. Antiprotons were produced when the proton beam in the Bevatron struck an internal copper target. Since the antiprotons were negatively charged, the machine's magnetic field bent them out of the Bevatron's circular orbit into an external beamline where their charge, momentum, and velocity were measured. After about a month of intermittent data taking, the group was able to report in September 1955 the unambiguous observation of antiprotons. The Nobel Prize followed in 1959.

Owen continued studying antiprotons for another few years, and with students and colleagues he made seminal measurements of their interaction cross sections. In 1960, however, he embarked on a completely new research program that was to occupy him for the

Recently posted death notices at <http://www.physicstoday.org/obits>:

William A. Shurcliff	27 March 1909 — 20 June 2006
Iwao Ogawa	1922 — 13 June 2006
Leopold Halpern	June 1925 — 03 June 2006
Yoram Kaufman	01 June 1948 — 31 May 2006
Kalman Shure	14 March 1924 — 14 April 2006
David L. Weaver	18 April 1937 — 04 April 2006
Neil Anthony Porter	04 September 1930 — 15 March 2006
Manoj Kanti Banerjee	25 May 1931 — 18 February 2006
Nelson Fuson	04 September 1913 — 05 February 2006

next 20 years. Anatole Abragam in France and Carson Jeffries in Berkeley had independently developed the technique of dynamic nuclear polarization a few years earlier, and Owen immediately realized the technique's potential for high-energy physics. He set about constructing a polarized target for use in particle scattering experiments. His versatility as a physicist came to the fore as he successfully mastered new techniques—including growing exotic crystals, making ^3He – ^4He refrigerator systems, and developing RF nuclear magnetic resonance detection systems—that were not usually part of the daily routine of particle physicists. Within a year he and his colleagues and students had produced the first of several polarized targets that were used over the next decades in a variety of experiments, from detailed measurements of the pion–nucleon system, to the study of spin dependence in high-energy scattering, to testing time-reversal symmetry in electroweak processes, to measuring the relative parities of hyperons. His groundbreaking efforts spawned a whole industry, and polarized targets soon sprung up in most of the major accelerator laboratories around the world.

In the 1970s, in close collaboration with a very talented group of young Japanese physicists, Owen and his group initiated a program of muon spin-rotation experiments at the 184-inch synchrocyclotron. They later jointly studied the interactions of energetic light nuclei with nuclear targets at the Bevalac facility at Lawrence Berkeley National Laboratory. Accepting another new challenge in the 1980s, Owen assumed responsibility for designing and overseeing the construction of the high-voltage field cages for the first time projection chamber. And in the late 1980s and early 1990s, he worked with colleagues at LBNL and SLAC to design and build a polarimeter that was used with great success at the Stanford Linear Collider to make a precision test of the standard model of electroweak interactions.

Owen loved to be confronted with new physics challenges, both conceptual and technical, and he invariably solved them in his own unique style. He knew the core concepts of physics so well that he could adapt them with skill and imagination to almost any problem that faced him. He argued conceptually rather than mathematically, and set a standard of correctness and rigor that was an inspiration, if also a hard act to follow. He was the one that colleagues

See www.pt.ims.ca/9467-33

and students would go to whenever they couldn't easily find the answer elsewhere, and seldom, if ever, did he fail to come up with an explanation that was not only to the point but often also unconventional. Similarly, when confronted with technical problems, he usually devised clever solutions that tended to be simple and elegant.

Physics was always important to Owen, but he also had a deep, abiding concern for the human condition. He was actively involved with human and civil rights, and immersed himself fully in the causes he believed in. An outspoken advocate for disarmament and peace, he became an early member of the Federation of American Scientists after World War II and was later a founding director of the Plowshares Fund. He was one of the faculty leaders in promoting students' rights during Berkeley's turbulent Free Speech Movement in the 1960s and was the cofounder and longtime co-chairman of the Special Opportunities Scholarships (SOS) program, designed to help talented but economically and socially deprived high-school students attend the University of California. He also actively participated in another SOS program, set up to ease the plight of Soviet colleagues Andrei Sakharov, Yuri Orlov, and Anatoly Shcharansky. Invited to Japan in the late 1980s to give a series of public lectures, he insisted on visiting Hiroshima to offer his personal apologies in its Peace Memorial Park. Such concern and compassion were typical of him.

Owen was a very special person who has left an indelible impression on those of us who have had the privilege of knowing him and working with him.

John Jaros

*Stanford Linear Accelerator Center
Menlo Park, California*

Shoji Nagamiya

KEK

Tsukuba, Japan

Herbert Steiner

University of California, Berkeley

Yuval Ne'eman

Yuval Ne'eman, distinguished theoretical physicist, soldier, politician, university president, and Israeli minister of science, died on 26 April 2006 in Tel Aviv, Israel.

Yuval was born in Tel Aviv in 1925; his parents descended from families that in the 19th century arrived in that part of the Ottoman Empire that later became Israel. He carried the name of his great-grandfather, who was one of

the first watchmakers in the region and who installed the first clock on the Jaffa clock tower built by the Ottoman Sultan Abdul Hamid II in 1906.

Except for a few years with his parents in Egypt, Yuval spent most of his childhood in Tel Aviv. He graduated from high school at age 15, received an engineering degree from the Technion—Israel Institute of Technology in Haifa at the age of 20, and then started working at the family water-pump factory. At age 15 he also enlisted in the *Haganah*, the Jewish underground organization that later became the Israeli army. When Israel declared its independence on his 23rd birthday, Yuval was an infantry officer fighting the invading Egyptian army. After the war ended, he advanced in the military, reaching the rank of colonel, and was put in charge of military planning and later promoted to deputy head of military intelligence.

His true intellectual passion was always physics. He studied engineering primarily to satisfy the family wish of continuing to produce water pumps for most of the Jewish and Arab farmers in the country. But an encounter with a Hebrew translation of Arthur Eddington's book *The Nature of the Physical World* (Cambridge U. Press, 1928) reignited his never-ending love affair with theoretical physics.

Yuval studied at a military college and later became the Israeli military attaché in London in 1958. Because of the geographical proximity of Israel's embassy to Imperial College London, the busy diplomat had the opportunity to attend classes on symmetries in particle physics, dominated at Imperial by Abdus Salam.

The chance encounter between the senior Israeli intelligence officer and the deeply religious Pakistani led to Yuval's PhD thesis, in which he discovered the $SU(3)$ symmetry theory of the hadrons. His thesis, which he completed in 1961 at age 36, provides anecdotal evidence that the prominence of extremely young theoretical physicists relates to their scientific, not biological, age.

Soon after Yuval's paper was published, Murray Gell-Mann, the great leading light of particle physics for two decades, independently published the same $SU(3)$ discovery, coining the term the Eightfold Way. A lifetime friendship between Murray and Yuval began with their first meeting and was fueled both by their mutual scientific tastes and by their truly encyclopedic interest in an incredible variety of subjects.

After Yuval, the "fresh PhD," returned to Israel in 1962, he began a se-