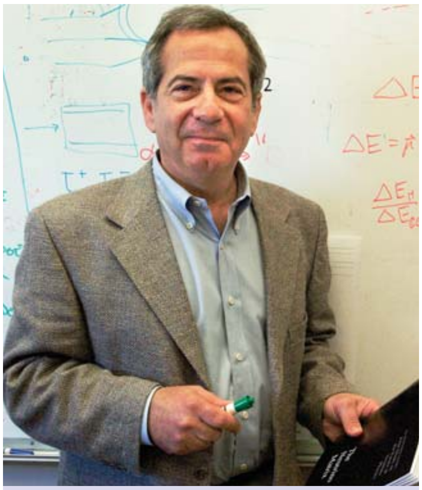
To notify the community about a colleague's death, subscribers can visit http://www.physicstoday.org/obituaries, where they can submit obituaries (up to 750 words), comments, and reminiscences. Each month recently posted material will be summarized here, in print. Select online obituaries will later appear in print.

Stuart Jay Freedman



LAWRENCE BERKELEY NATIONAL LABORATORY

Stuart Jay Freedman

Stuart Jay Freedman, who made fundamental contributions to atomic, nuclear, and particle physics, died suddenly on 10 November 2012, while attending a meeting in Santa Fe, New Mexico. Stuart was a professor of physics at the University of California, Berkeley, and held the Luis W. Alvarez Memorial Chair in Experimental Physics. He also had a joint appointment as faculty senior scientist at Lawrence Berkeley National Laboratory.

Stuart was born in Los Angeles on 13 January 1944 and grew up there. He went north to attend Berkeley as an undergraduate and received an engineering physics degree in 1965. As a graduate student there, he first pursued theoretical physics but later switched to experimental work under Eugene Commins, whose students from the same era included Frank Calaprice, Steven Chu, Phil Bucksbaum, and Persis Drell.

Stuart's investigations may be divided into several distinct classes: traditional measurements of the properties of nuclei; searches for exotic phenomena such as free quarks; incisive disproof of widely heralded anomalous results; and precision measurements of fundamental parameters, especially of neutrons and neutrinos. Many of his results, including both his earliest and final experiments, had profound consequences. Although Stuart collaborated with many distinguished colleagues, nothing delighted him more than working with students and postdocs, whom he mentored and in whom he endeavored to instill his passion for physics and his ample sense of irreverence.

For his 1972 thesis, Stuart carried out the first test of Bell's inequality using the cascade $4p^2\,{}^1S_0 \rightarrow 4p4s\,{}^1P_1 \rightarrow 4s^2\,{}^1S_0$ in calcium. Working with John Clauser, he found that his results, when using what became known as the Freedman inequality, agreed with quantum mechanics but disagreed with the predictions of hidden-variable theories by six standard deviations.

In 1998 Stuart and Atsuto Suzuki decided to collaborate on building a 1000-ton electron-antineutrino detector in the underground cavity originally home to Kamiokande in Japan. They noticed that Japan's nuclear reactors, which generated a large fraction of the country's energy and also a large number of antineutrinos, lay roughly on a circle centered on the Kamiokande site. The new detector, KamLAND, would search for neutrino oscillations over a baseline of some 200 kilometers, far longer than had ever been used for reactor antineutrino physics, and it would make it possible to explore terrestrially the same physics as solar neutrino investigations.

Built in an extraordinarily short time, the KamLAND experiment in 2003 showed that electron antineutrinos changed flavor and disappeared, as would be expected for the "large mixing angle" solution for the oscillation of electron neutrinos from the Sun. With continued running, KamLAND obtained such statistical accuracy that one could clearly see for the first time the oscillatory pattern for which neutrino oscillations are named. The experiment later measured antineutrinos coming from beta decays from deep within Earth.

Between the search for hidden variables and reactor neutrino measurements, Stuart explored an astonishing range of topics. In nuclear decays, he studied weak magnetism and produced limits on second-class currents and on violation of time-reversal invariance. He measured the positron decay spectrum of boron-8 and the energy of the decay's final state, beryllium-8, to understand the high-energy solar neutrino spectrum. Using a clever experiment that included a simulated signal, he disproved claims of a neutrino with a mass of 17 keV. Stuart turned repeatedly to the question of discrete electron–positron energies in collisions with heavy nuclei, and in every instance he found no sign of such an effect. He measured the parameters of neutron decay, both lifetime and correlations, to pin down the values of the electroweak coupling constants and to test for *T*-odd effects.

Stuart was interested in physics beyond the standard model and set good limits on the existence of axions, light Higgs bosons, free quarks, and violation of charge-conjugation invariance in the decay of positronium. He and collaborators demonstrated the trapping of short-lived radioactive isotopes by storing 4×10^3 atoms of sodium-21. At the time of his death, Stuart was US spokesperson for KamLAND and for the Cryogenic Underground Observatory for Rare Events and KamLAND-Zen experiments, which look for neutrinoless double beta decay.

After leaving Berkeley in 1972, Stuart spent five years at Princeton University, followed by five years at Stanford University. In 1983 he moved to Argonne National Laboratory, then joined the faculty at the University of Chicago, and then returned to Berkeley in 1991. He was chair of the American Physical Society's division of nuclear physics in 1998. He received many honors and awards, including APS's 2007 Tom W. Bonner Prize in Nuclear Physics.

Stuart had a superb sense of humor, which was frequently expressed in wry or Delphic remarks. The uninitiated could be baffled, but those who had acquired the language were treated to incisive analyses of wayward experiments or bureaucratic malfeasance. The latter he regarded as a continuing source of amusement; he summed it up with, "Life is a personnel problem."

Robert N. Cahn
Lawrence Berkeley National Laboratory
Berkeley, California
R. G. Hamish Robertson
University of Washington
Seattle ■

Recently posted notices at http://www.physicstoday.org/obituaries:

Bryce Bayer
15 August 1929 – 13 November 2012
Sean Barrett
1976 – 19 October 2012
Peter Marshall
1937 – 5 October 2012