

# Paul Leon Hartman

*July 13, 1913 — May 20, 2005*

Paul Leon Hartman, a pioneering researcher and Professor Emeritus of Physics, and of Applied and Engineering Physics, died on May 20, 2005, at home at Kendal at Ithaca. Paul had been associated with Cornell for 71 years!

Born in Reno, Nevada on July 13, 1913, he was the eldest son of a physicist father, Leon W., and an astronomer mother, Edith K. Hartman. Paul earned a B.S. degree in Electrical Engineering at the University of Nevada, where his father was chairman of the Physics Department. Paul came to Cornell in 1934 to start graduate study in physics. (His father had come to Cornell as an undergraduate in 1895. Paul's lifelong interests in science, the West, and Cornell were set early.) Paul did his thesis work here on an early linear accelerator with Professor Lloyd P. Smith, a fellow Nevadan, receiving his Ph.D. degree in 1938. After a year as Instructor of Physics, Paul left to work for the next seven years at the Bell Telephone Laboratories in New York City. There he was actively involved in developing centimeter-wave generators for airborne radar during World War II. Most of his work was carried out at the laboratory bench level, but occasionally he was flown to an air force base to trouble-shoot these early radar units.

He returned to Cornell and academic life in 1946 as an Assistant Professor with a joint appointment both in Physics and in the brand new program in Engineering Physics. This new program recognized the need for a stronger physics component in the engineering sciences. Paul was an active charter member in formulating and guiding this program. The underlying philosophy envisaged a heavy dose of physics and mathematics mixed in with traditional engineering, but coupled with careful student advising. The program attracted very good students and quickly developed a strong reputation, which it has to this day.

In teaching, Paul quickly moved into the leadership position in the venerable Advanced Laboratory Course at Cornell (the famous "410/510 Lab"), required of all physics and EP undergraduates and graduate students, experimentalists and theoreticians alike. Paul's energy and wide-ranging skills as an experimentalist enabled him to interact strongly and effectively with students working on any of the more than 60 experiments. He loved the challenge and satisfactions of teaching in this course, which strongly influenced so many future physicists. He continued in this role for nearly 40 years during which many former students went on to set up similar courses elsewhere.

Paul's research focused on the physics of ultraviolet electromagnetic radiation and its interaction with matter, especially on photoemission from ionic crystals and on the formation of excitons. But he was probably best known for his pioneering investigation, carried out with colleague Diran Tomboulian, of the spectrum of electromagnetic radiation emitted by electrons circulating in a synchrotron. The measurements were performed in 1953, on the 300 MeV synchrotron at the Laboratory of Nuclear Studies at Cornell. A vacuum ultraviolet spectrograph was connected directly to the synchrotron to record the intensity of the emitted light in the wavelength range 5 – 40 nm (i.e. from soft x-ray to far ultraviolet) without intervening windows.

The results were dramatic and far reaching: "It was a gorgeous piece of physics," says Dale Corson, President Emeritus, former Chair of the Physics Department and a close friend of Hartman's for many years. "The spectrum had been calculated by (Schwinger) at Harvard, but Hartman and Tomboulian essentially confirmed the calculation. It really was a tour de force."

Most importantly their results demonstrated the potential of synchrotron radiation as a new broadband source of x-rays and ultraviolet radiation. Until then, this radiation had been viewed mostly as a nuisance and an inevitable cause of energy loss for the particle physics experiments. It was not until the next decade that synchrotron sources began to appear to actually exploit this radiation for studies of atoms and molecules and solids. In his later years, Paul was an active participant in developing the Cornell High Energy Synchrotron Source (CHESS). This now provides an extremely bright source of hard x-rays, which are used to study such things as the molecular structure of proteins.

Paul spent three sabbatic leaves and many summers at the Los Alamos Scientific Laboratory in New Mexico, working on measurement of the light emitted by electron bombardment of the atmosphere, and also exploring the Southwest with his family.

Paul enjoyed all parts of the traditional academic life, including advising students and patiently building faculty consensus for new programs. He served as Associate Director of the School of Applied and Engineering Physics from 1971-83. He also served as Secretary of the Cornell University Faculty for three years in the late 1970s. Colleagues came to recognize and enjoy his unpretentious, direct, and highly personal style of writing and many looked forward to the regular appearance of the *Chronicle* to read his faculty minutes.

After his retirement in 1983, Paul turned to writing a memoir and informal history of the Cornell Physics Department. Blending his own clear recollections of the pre-World War II days with nuggets from the early archives, and his impressions of the rapid post-War expansion, Paul produced a very readable "history of sorts."

He continued in this vein with a similar history of the School of Applied and Engineering Physics, and yet another of the founding of the Materials Science Center at Cornell.

In 1993, Paul put together a similar informal history of the early years of the leading physics journal, the *Physical Review*, which, remarkably, was started at Cornell in 1893 and spent its first 20 years in Ithaca before being taken over by the American Physical Society. Paul's history was published on the occasion of the centennial of the *Physical Review*.

Throughout his life, Paul enjoyed many extracurricular interests. An amateur astronomer (but with considerable expertise), he built and owned numerous telescopes. He also pursued photography, baked bread weekly, grew grapes and made wine, gardened, painted, was a blood donor of note, and volunteered for the Red Cross. He camped and hiked with family and friends throughout the United States.

His wife, Margaret (Peggy), survives him as do three daughters: Barbara H. Freeman of Cape Elizabeth, Maine; Laurel L. Hartman of Ithaca; and Sara W. Hartman of Maynard, Massachusetts; two grandchildren and their spouses; and four great granddaughters.

We will miss a warm and enthusiastic colleague who loved experimental physics.

*Neil W. Ashcroft, John Silcox, Douglas B. Fitchen*