obituaries

Marton took inspiration from the philosophy of Spinoza, especially from a sentence in Spinoza's *Ethics*: "There is nothing over which a free man ponders less than death; his wisdom is to meditate not on death, but on life."

HOWLAND A. FOWLER
National Bureau of Standards
Washington, D.C.

Paul I. Richards

Paul I. Richards, a physicist and applied mathematician at the Arcon Corporation, Waltham, Massachusetts, died 19 November. Born in 1923 in Orono, Maine, he received his PhD in physics from Harvard in 1947. During the period 1943–1945 he worked as a research associate in the Radio Research Laboratory at Harvard. From 1947 to 1952 he was a physicist at Brookhaven National Laboratory during which time he worked in collaboration with E. E. Hays and Samuel Goudsmit on the development of the magnetic time-of-flight mass spectrometer. During this period his interests also extended into the fields of artificial intelligence, operations research, and pure and applied mathematics.

In 1952 Richards joined Transistor Products, Inc., Division of Clevite Corporation, where he served as director of research for two years. He then became associated with Technical Operations, Inc. where he held the position of senior physicist for 14 years. Since 1968 he had been a senior scientist with the Arcon Corporation. During these years he was primarily occupied with radiation transport problems. He developed a rigorous Boltzmann equation solution for neutron transport in an infinite air atmosphere and an improved atmospheric diffusion theory for neutrons. His other work includes thermal radiation transport theory, shock-wave and hydrodynamic theory and the development of associated computational techniques. His contributions to these fields placed him among the most prominent industrial physicists of his time.

Richards served on the Publications Committee of the Society for Industrial and Applied Mathematics from 1965 to 1968 and was an editor of *SIAM Review* during the same period. He wrote two books. The first, *Manual of Mathematical Physics*, published in 1959, is a useful collection of formulas and theorems for physicists, while his second book, *Proper Words in Proper Places*, published in 1964, serves as a guide for technical writers.

Beyond his professional achievements, he was a lover of nature and an accomplished musician. Paul Richards will be remembered by those who were fortunate enough to know him as a kind and gifted

man who shared both of these attributes with unfaltering generosity.

STANLEY WOOLF
ARCON Corporation
Waltham, Massachusetts

Kenneth W. Robinson

Kenneth Robinson, a retired theoretical accelerator physicist at the Cambridge Electron Accelerator of Harvard University and MIT, died 11 January in San Diego, California. He was born in San Diego in 1925, took his undergraduate training at Caltech and his graduate work at Princeton. He worked briefly as a Research Engineer at the RCA Laboratories but spent most of his professional life with the CEA in Cambridge. His work was innovative, accurate and highly respected by his colleagues, especially other theoretical scientists. He was known within his small circle of admirers as a person who was always correct in his calculations and predictions.

Robinson published a paper in 1958 in the *Physical Review* on radiation effects in circular electron accelerators, which dealt with radiation damping and quantum excitation of single-particle motion, in which he enunciated for the first time the fundamental result that the sum of the damping rates for the three degrees of freedom is a constant independent of the focussing structure of the guide field and of the geometric arrangement of the radiofrequency accelerating fields. His studies of the coherent interaction between beams and radiofrequency cavities established important criteria for the design and tuning of rf systems. He foresaw, as early as 1956, several applications of wiggler magnets of different designs to the control of beam size as well as to the production of enhanced synchrotron radiation. Possibly the most influential of Robinson's accomplishments was his coinvention, with G.-A. Voss, of the low-beta technique for attaining, with limited stored currents, higher luminosities than has previously been thought feasible in colliding-beam storage rings. That technique—first demonstrated in the CEA Bypass System—has subsequently been used in all colliding-beam storage ring designs.

Robinson was a retiring and modest person and never married. When the CEA closed in 1974 he retired and subsequently had few communications with his former colleagues. However, those of us who knew and respected him feel that he made many important contributions to science in the active years he spent among us. He died of a heart attack in his apartment and burial was arranged by the Public Administrator of San Diego.

M. STANLEY LIVINGSTON
Santa Fe, New Mexico
JOHN R. REES
Stanford Linear Accelerator Center □