ratories to develop instruments to pursue similar studies. He also collaborated in building the first medical linear accelerator for the treatment of cancer at the Stanford Medical School. Together with Gerard K. O'Neill, Bernard Gittleman and Burton Richter, he helped carry out the first colliding-beam experiment in the early 1960s. That experiment set new limits on the validity of quantum electrodynamics at small distances. He was a member of the Project "M" committee that initially launched SLAC, and he was a promoter of the racetrack microtron concept for accelerating electrons. At MIT he continued his studies of nuclear structure by electron and photon scattering and electroproduction.

Carl was a kind and gentle person who encouraged an active laboratory social life. He knew that a good working atmosphere and high morale were at least as important in achieving laboratory goals as directives handed down from above. Carl was also a good tennis player and a good chess player.

Colleagues from laboratories around the world, including Europe, South America and Japan, have been warm and strong in showing their appreciation for Carl's advice and active personal help. It was characteristic of Carl's modest and unassuming temperament that many of his colleagues, and even his family, were not fully aware of his efforts on behalf of others. Carl will be remembered with great respect and affection by his students, friends and colleagues.

GERALD PETERSON
University of Massachusetts, Amherst
PETER T. DEMOS
WILLIAM E. TURCHINETZ
Massachusetts Institute of Technology
Cambridge, Massachusetts
PERRY B. WILSON
WOLFGANG K. H. PANOFSKY
Stanford Linear Accelerator Center
Stanford, California

Edwin A. Yunker

Edwin A. Yunker, professor emeritus of physics at Oregon State University, died on 21 July 1990 at the age of 88.

Yunker was born in 1901 in Gresham, Oregon. He studied at Oregon Agricultural College (now Oregon State) in 1919 and at the University of California, Berkeley, earning his AB in physics from the latter in 1924. He served as an instructor in physics at Oregon State from 1925 to 1933 and as an assistant professor there from 1933 to 1939. From 1937 to 1940 he completed his PhD at Stanford University under the supervision of Norris Bradbury. In his research with Bradbury he used a cloud chamber to study various effects on the distribution of atmospheric condensation nuclei.

In the summer of 1941 Yunker was sent by the government to study microwave physics at MIT, after which he returned to Oregon State to establish courses on that subject. From 1942 to 1946 he headed the transmitter division of the Radio Research Laboratory at Harvard University, where he developed countermeasures against enemy radar. He also collaborated in writing several books on the work of the laboratory.

On returning to Oregon State in 1946, Yunker taught radio and electronics courses and also directed a group researching millimeter waves. As chairman of the physics department from 1949 to 1966, he presided over a period of great expansion: Many new areas of research were opened, and the program in meteorology grew into a separate department of atmospheric sciences. Yunker also coordinated the construction of a cyclotron, which was completed under his direction in 1957.

After his retirement in 1968 he maintained an active interest in physics and in the physics department at Oregon State. In 1982 he and his wife, Gertrude, endowed an annual departmental lecture series for visiting speakers.

A prolific writer, Yunker prepared reminiscences for his children and grandchildren. These short pieces overflow with his love of the outdoors and for hunting, fishing, boating and camping in the San Juan Islands. His recollections of his early life on the family farm also give a unique insight into life in rural Oregon in the early 1900s.

KENNETH S. KRANE
DAVID B. NICODEMUS
Oregon State University
Corvallis, Oregon

Arnold Rosenblum

Arnold Rosenblum died unexpectedly at the age of 47 the night of 1 January 1991 at his home in Logan, Utah. He was an associate professor of physics and the director of the International Institute of Theoretical Physics at Utah State University in Logan.

Born in Brooklyn, New York, on 24 June 1943, Arnold graduated from Columbia College with a BA in physics in 1964 and received his MS from the University of Pennsylvania the following year. He continued graduate studies at Temple University, working with Peter Havas, and earned his PhD in physics in 1970.

After holding a one-year postdoctoral fellowship at the University of British Columbia, Arnold was a research associate at Temple University for one term. Simultaneously he started what became a long-term collaboration with Jeffrey M. Cohen at the University of Pennsylvania on problems in relativistic astrophysics. He continued this work in Germany, where he was a research associate at the University of Bonn from 1972 to 1974 and then at the Max Planck Institute for Physics and Astrophysics in Munich until 1978.

In 1978 he returned to the US, where he held visiting positions at Temple University and the University of Pennsylvania. He was codirector of a NATO summer school on supergravity in 1983 and of a NATO advanced workshop on gravity and supergravity in 1986. He accepted a position as associate professor of physics at Utah State University in 1985, where, together with V. Gordon Lind, he established the International Institute of Theoretical Physics there.

Arnold's thesis work on special relativistic equations of motion led him to a number of investigations of general relativistic equations of motion as well as of the special relativistic equations of motion of singularities of classical Yang–Mills–Higgs field. He also carried out studies in relativistic astrophysics, and he considered possible observational tests of the general theory of relativity as well as the problem of clock synchronization in that theory. His interest in relativity and in elementary-particle physics then led him into studies of supergravity and supersymmetry and of problems of interacting classical and quantum systems—studies that were cut short by his untimely death.

Arnold's intellectual curiosity and his love of people led him into lengthy discussion with an ever widening circle of friends in many fields. He had a remarkable ability to recognize the important aspects of talks at scientific meetings and the connections between one scientist's work and that of another working on an entirely different problem. He frequently acted as a cross-fertilizer or as a catalyst in several fields and stimulated many collaborations. At the various meetings he organized, he always provided an atmosphere that was both informal and stimulating and enlivened it with his own brand of humor.

Arnold's energy and enthusiasm for physics were an inspiration to many,

and he and his constant flow of ideas will be sorely missed by all who knew him.

JEFFREY M. COHEN
University of Pennsylvania
Philadelphia, Pennsylvania
PETER HAVAS
Temple University
Philadelphia, Pennsylvania
V. GORDON LIND
Utah State University
Logan, Utah

David Sloan

David Sloan, a prominent figure in physics for over half a century, died on 30 September 1990, at the age of 86.

Sloan was among the first members of Ernest O. Lawrence's team at the University of California, Berkeley, before the birth of the Radiation Laboratory there. He was enticed by Lawrence to come from the General Electric research lab at Schenectady to do graduate work at Berkeley. As a graduate student, Sloan built the first practical version of the Wideroe ion accelerator (also known as the Sloan–Lawrence accelerator), and in 1932 he built a machine that accelerated mercury ions to 2.85 MeV. It was said Sloan had a substantial influence on every accelerator that was made in Berkeley until the time he left in the early 1960s. He influenced not only the development of accelerators intended for nuclear research but also the invention of a novel type of high-voltage x-ray generator, referred to as the Sloan tube, that was used for clinical studies at the University of California Hospital in San Francisco. Among the patients who benefited was Lawrence's mother, who was successfully treated for cancer in 1937. Sloan also invented a resonant transformer that was used to drive a single drift-tube accelerator for positive ions. It was characteristic of Dave that he did not allow his contributions to lapse during some of the extended periods when severe back trouble confined him to his bed in the men's faculty club on the Berkeley campus.

During World War II, Sloan contributed to the development of radar and his resnatron tubes were used for jamming German radar.

Sloan pursued a career in industry after leaving Berkeley. He joined Physics International in 1963 and stayed there as a senior scientist until his retirement in the early 1980s. Sloan's role was to arrive at original concepts for new technical challenges. From his days at the Rad Lab, Sloan brought much experience with the problem of transient breakdown to the field that became pulsed power. Those in the field were just beginning to use stacked lines to store energy transiently at high electric fields. Sloan's forte was techniques for avoiding flashover of insulators. He brought to this challenge a depth of understanding: He regarded charges, currents and fields in graphically physical terms, and his simple, elegant explanations of complex phenomena were well known. He was instrumental in convincing the government to build the large pulsed-power generators of the time, culminating in Aurora, which was commissioned at the Harry Diamond Laboratories in 1971. Sloan was an early advocate of inductive energy storage and conducted experiments on opening-switch technology in the 1970s, long before it became a major national program.

Sloan was a fount of ideas: It was said that Physics International needed 40 engineers to follow up on all of them. He was famous for stating a problem and then immediately giving the answer, leaving his colleagues to work out the connecting argument. However, he never cared about taking credit for his many inventions and concepts. Sloan cared only that the problem be solved and that the equipment work.

In his private life he was fascinated with geology and spent much time in the deserts and mountains of the West, which he knew intimately from many years of hiking. Sloan's legacy lives on in the many devices he conceived and developed.

JAMES BENFORD
Physics International Company
San Leandro, California
EDWARD LOFGREN
L. JACKSON LASLETT
ANDY FALTENS
Lawrence Berkeley Laboratory
Berkeley, California

William L. McLean

On 7 December 1990 William L. McLean died of cancer in the 57th year of his life and in his 30th year at Rutgers University. He had continued to work and teach until the day before he entered the hospital for his final stay, and it was characteristic of his intensely private nature that few people knew of his illness.

He was born in New Zealand, where he remained until he became a graduate student at Cambridge University after getting his bachelor's and master's degrees at the University of Otago. At Cambridge he was a student of Brian Pippard. His PhD thesis on measurements of the superconducting penetration depth led to his lifelong interest in superconductivity.

After one year at the University of British Columbia, Bill came to Rutgers. Among the subjects to which his research contributed were helicon propagation, flux penetration and vortex dynamics in type-II superconductors, and the superconducting proximity effect. He and his student Joseph C. Amato demonstrated third-harmonic generation in a superconductor in response to a microwave field, and they used this process to determine the relaxation time of the superconducting order parameter.

In 1980 Bill's attention shifted to disordered superconductors as exemplified by granular metals and to the relation between the existence of superconductivity and the metal–insulator transition. After 1987 he worked on high-T_c superconductors, particularly on dimensional effects in multilayers.

All these endeavors were characterized by meticulous attention to detail, both in the experiment and in the analysis. Bill brought the same powers of analysis to all his work and was widely sought after as a reviewer and referee. In his graduate courses also he looked at each subject as if it were new, rather than just following a standard outline. Bill almost never talked about himself, but he was always open to hearing from others. He had friends in many parts of the world and particularly enjoyed environments and experiences among cultures different from his own. In many ways Bill was the antithesis of the modern aggressive and competitive scientific entrepreneur. We will remember him rather as a person of quiet integrity who devoted himself to thoughtful search after meaning and understanding.

PETER LINDENFELD
Rutgers University
Piscataway, New Jersey

Kundan S. Singwi

Kundan S. Singwi, Fayerweather Emeritus Professor of Physics and Astronomy at Northwestern University, died suddenly of a heart attack on 18 October 1990, at the age of 71.

Singwi was born in Udaipur, India. He received his undergraduate and graduate education at Allahabad University and was awarded the doctor of science degree in 1949. After doing postdoctoral work at the University of Birmingham in England and the Uni-