ROBERT LAWRENCE JEPSEN

on the space charge theory of the magnetron oscillator. Because of this research, he was an ideal candidate to direct microwave research at Varian.

Bob joined Varian when the company occupied a small manufacturing building in San Carlos, California. In 1956, he led a program involving the investigation of electronic vacuum pumping to eliminate oil contamination of klystron cathodes. This effort led to the invention, with Lewis D. Hall of his group, of the VacIon pump in 1957. Bob's magnetron theory, which showed that the pumping speed of a Penning cell should be independent of the cell's diameter, led to the design of honeycomb-shaped anodes and commercial VacIon pumps with speeds of thousands of liters per second.

In 1957, through the Varian advanced study program, Bob attended Harvard University for the academic year. There, he studied magnetism in the laboratory of J. H. van Vleck. In 1961, Bob became the manager of research for the newly established Varian vacuum division based on the VacIon pump. He and his colleagues invented and developed the UHV technologies familiar to us today that are used in applications including particle and medical accelerators, and in surface science experiments.

During the early 1960s, Bob discovered the mechanism of noble gas pumping in VacIon pumps, which had been a great mystery. Whereas chemically active gases are pumped by reaction with sputtered titanium, the mechanism for the observed small pumping speed for neon and argon was not understood. Bob proved that a fraction of noble gas ions are kinetically reflected from the cathode as neutrals, and buried in the anode surface. This effect could then be enhanced for noble gas pumping.

In 1964, Bob became director of research of Varian's Central Research Laboratory, where he managed a large staff of scientists and engineers pursuing programs in materials science. From 1968 to 1974, he managed an electrographics start-up project, in collaboration with Edward L. Ginzton. Subsequently he studied and passed the US patent bar exam and, as a patent agent, wrote and coordinated the patents of Varian's industrial equipment group.

Bob retired in 1982, after 30 years at Varian, to grow wine grapes in the Pacific Northwest and to live in his home state of Washington, where he grew up as a farm boy.

Bob was a director of the American Vacuum Society (now called AVS: The Science and Technology Society) from 1964 to 1966. He was program chair of the society's annual meeting in 1965.

An especially considerate and thoughtful person, Bob was also known for his integrity and generosity in sharing credit for advances made by him and under his influence. He left this impression on his many colleagues as an ideal to be achieved in their careers. When Bob returned from a visit to England, a colleague asked him, "How was everything in England?" Bob replied, "Well I don't know about everything in England." This illustrated his complete lack of superficiality and his desire to give honest and accurate answers to all questions.

Bob was at the heart of the early development of Varian Associates. For the Varian founders and for Russell Varian, the word "Associates" carried a special meaning: "A man has the right to know the significance of what he is doing. . . ." Bob embraced this view throughout his career. While essentially modest, Bob's views were reinforced with an especially crushing handshake, developed from milking cows as a boy.

Bob hiked avidly in the Sierras, and was known to enjoy a good cigar, a glass of fine wine, and playing his viola. His colleagues remember him as one who had a major impact on their lives.

JOHN C. HELMER
Menlo Park, California
MARCEL W. MULLER
Washington University
St. Louis, Missouri
SHERMAN RUTHERFORD
Duniway Stockroom Corporation
Mountain View, California
IRA WEISSMAN
Palo Alto, California

Lester Machta

Lester Machta, founder and director of the Air Resources Laboratory (ARL) of the National Oceanic and Atmospheric Administration (NOAA), died of leukemia in Washington, DC, on 31 August 2001. As director of ARL, he was known in the scientific community for his innovative work in such diverse areas as transport of radioactive materials, the increase in greenhouse gases, ozone depletion, and other problems that required an understanding of both meteorology and chemistry.

Machta was born on 17 February 1919 in Brooklyn, New York. He went to Brooklyn College at age 16 and received a BS in mathematics in 1939. With some meteorological graduate training behind him, he began his career as part of an effort at the start of World War II to prepare hundreds of officers to serve as forecasters in locations all over the world. At that time, meteorology and the practical need to forecast weather for armed services operations were in their infancy. Many wartime forecasters remember Machta's lectures at Army and Army Air Corps training centers in Chanute Field, Illinois, and Grand Rapids, Michigan.

On returning to civilian life, Machta completed an MS in meteorology at New York University in 1946 and a ScD in meteorology at MIT in 1948. His doctoral thesis, "A Study of the Observed Deviations from the Geostrophic Wind," was prepared under the direction of James Austin. In that same year, Harry Wexler, head of US Weather Bureau research, selected Machta to lead a special projects section—which later was called ARL—whose main purpose was to address meteorological and environmental aspects of postwar nuclear activities.

With the end of World War II and the dropping of the atomic bomb on Japan, a new conflict began—the cold war. To the surprise of most people, the Soviets tested their first atomic bomb in 1949, which resulted in an intensive US effort to understand where the bomb was tested, what its yield was, and where the winds transported the radioactive material. Machta participated from the beginning using meteorological analysis to try to understand these questions. Even today, much of his work is still classified. Following the development of the hydrogen bomb, both the USSR and the US continued testing in the atmosphere. The well-known Nevada and Bikini tests throughout the 1950s and into the 1960s were a part of this


LESTER MACHTA

effort. ARL assisted in this testing by providing information on transport of the fallout, which eventually encircled the world. At that time, Machta proposed that the radioactive materials could be used as tracers to understand weather systems. Eventually, because of human health concerns, the atmospheric testing was banned in 1963. However, because countries continue testing and producing nuclear weapons to this day, Machta worked on this subject until his death.

Although radioactive material in the atmosphere was a major concern during the 1960s, it was soon realized that humankind was affecting the environment in more subtle ways. Machta had an admirable gift for identifying issues—for example, the continuous increase in carbon dioxide—that would seriously impact the environment and the climate. Through the pioneering work of David Keeling, CO_2 was being measured at Mauna Loa and on the South Pole. Machta played a critical role in the early 1970s, however, taking over the operation and maintenance of the Mauna Loa Observatory, which was on the verge of being closed due to funding shortfalls. He was instrumental in establishing, in 1971, the geophysical monitoring for climate change program (now in the Climate Monitoring and Diagnostics Laboratory/NOAA) long before climate change became a household term. Besides saving Mauna Loa, he established new global observatories in Barrow, Alaska, and American Samoa. These global stations, in addition to the South Pole station, and another 18 observatories around the world continue to provide scientific measurements for an understanding of global climate change.

Machta also deserves recognition for his work in the area of stratospheric ozone. Measurement of total column ozone goes back to the 1930s with the development of the Dobson spectrophotometer. This instrument measures the amount of ultraviolet (UV) radiation absorbed by ozone in the stratosphere and, using different pairs of wavelengths, can determine the amount of ozone in a column above the observer. A network of Dobsons was established during the International Geophysical Year (1957–58) and continues to take measurements to this day. At ARL in 1971, Machta, who realized the importance of such measurements, established a unit that would not only measure total column ozone around the world but also ensure the calibration of the Dobson spectrophotometers. Thus, through his foresight, a measurement system was well in place by the 1970s, when the question of chlorofluorcarbons and their effect on the depletion of the stratospheric ozone layer was raised.

Those who have known Machta were fascinated by the breadth of his many scientific interests. ARL, with which he was associated for almost 50 years, reflected this diversity. Besides ARL headquarters in Silver Spring, Maryland, there are five branches throughout the US. Machta orchestrated these units in a very low-key manner with carefully chosen, competent scientific leaders. Under Machta's leadership, ARL has contributed to such diverse fields as modeling regional air pollution, measuring UV radiation, developing a network to monitor wet and dry deposition, and understanding the dispersion and diffusion of materials from a source such as a nuclear power plant.

Unquestionably, Machta was on the forefront of environmental science for many years. His colleagues have many memories of his quiet nature, which would not bend to pressure to bypass the science. Machta expressed his concern for others in an understated way, exemplified by his always insisting on leaving an elevator last, even in the presence of much younger men—which often resulted in a humorous "after you, Gaston" standoff—and standing aside in a circle of friends to let an approaching party—no matter how junior or unknown—join the discussion. He was not one to show anger even when it would seem appropriate. On meeting this well-known laboratory director and scientist, junior colleagues, who might have expected to find a less accessible person, were surprised by his gentle nature. Machta's colleagues and friends have been enriched by working with him and will miss his guidance and patient understanding.

JOHN MILLER
JIM ANGELL
DIAN SEIDEL
National Oceanic and Atmospheric Administration
Silver Spring, Maryland

Philip Edward Seiden

Philip Edward Seiden, a condensed matter physicist, astronomer, immunologist, and manager, died 21 April 2001 in Briarcliff Manor, New York, of complications arising from long and largely successful battles with cancer and heart disease.

Phil was born in Troy, New York, on 25 December 1934. He received his MS in physics in 1956 from the University of Chicago and then earned his PhD in physics from Stanford University in 1960 under the direction of John Shaw. His doctoral research was on magnetic resonance of yttrium iron garnets.

Phil spent the major part of his life working at IBM Corp's T. J. Watson Research Center in Yorktown Heights, New York. Starting in 1960 as a research staff member, he quickly rose through the management ranks and was appointed director of the physical sciences department (1972–76) and then of the general sciences department (1976–77). He worked in the areas of magnetism, superconductivity, and organic solids during the early stages of his career at IBM. As early as 1973, Phil foresaw the field of molecular electronics, and, in 1974, he and Ari Aviram received the first patent in this field. Phil championed the study of organic materials at IBM throughout his life.

Restless to do basic research, Phil left management in 1977 and spent the rest of his time at IBM working in areas that interested him. He began a second career in astronomy with his pioneering work on the spiral structure of galaxies. By introducing a stochastic model in which star formation propagates around inside a shearing galaxy disk, Phil and his colleagues Humberto Gerola and Lawrence Schulman demonstrated during the period 1978–84 that the optical appearance of spiral structure could be the result of sheared star formation. They also found that star formation in very small galaxies should vary strongly with time because of the same propagation phenomena.

In 1989, in collaboration with Bruce and Debra Elmegreen, Phil discovered symmetric interference patterns in the intensity of spiral arms. This was the