

solids. In 1961 Ljubov obtained her physics and mathematics candidate degree from Leningrad State University for her high-resolution spectroscopic studies of small molecular anions stabilized as centers of luminescence in alkali halide crystals. She was one of the principals in bringing studies of the luminescence of solids to the modern level of high-resolution laser spectroscopy. She became a professor of physics at Tartu University in 1980.

Ljubov and her coworkers performed quite a number of excellent experiments on regular and hot luminescence, light scattering, Raman excitation profiles and high- $T_c$  Raman spectroscopy. Their best-known achievement certainly was the discovery of persistent spectral hole-burning in 1974. This discovery opened up new perspectives for high-spectral-resolution spectroscopy and for the photochemistry of molecules and solids. It also opened up new fields of applications, including hole-burning optical data storage and processing. Today the field of persistent spectral hole-burning is growing and is being studied in many laboratories.

Spectroscopy has suffered a truly great loss with Ljubov's passing.

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University of California, Irvine

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## James J. Brophy

James J. Brophy died on 14 December 1991 of complications arising from pancreatic cancer. Brophy's distinguished career in condensed matter physics and in academic and scientific management spanned more than 40 years. In spite of his illness he remained active until the day he died.

Brophy was born in 1926 near Chicago, and he received his BS (1947), MS (1949) and PhD (1951) degrees in physics and engineering from the Illinois Institute of Technology. After getting his PhD, Brophy was a research physicist at the IIT Research Institute, and he later became a professor of physics at IIT.

Reflecting this background, his classic book *Basic Electronics for Scientists* (McGraw-Hill, New York, 1963), now in its fifth edition, is used in both physics and engineering classes throughout the country. Brophy published three other books during his lifetime, including *Electronic Processes in Materials* (McGraw-Hill, New York) with Leonid V. Azarov in 1963.



James J. Brophy

Brophy was a consummate expert on low-frequency noise in solids. He was a pioneer in the study of fluctuations in materials. From his early studies in the 1950s of noise in germanium to his most recent papers on noise in sodium beta alumina, Brophy's contributions to the field were both timely and insightful. He was among the first to recognize both the practical and theoretical importance of understanding low-frequency noise, primarily  $1/f$  noise, in semiconductors. At the time of his death he had almost completed the first draft of a book entitled *An Historical Perspective of  $1/f$  Noise*.

Brophy was also a leader in academic and scientific management. He held various management positions at the Illinois Institute of Technology and the IIT Research Institute, and he also served as academic vice president at IIT from 1967 to 1976. He then became a senior vice president of the Institute of Gas Technology. From 1980 until his retirement in 1991 Brophy held the positions of vice president for research, professor of physics and professor of electrical engineering at the University of Utah.

Those who knew Jim will remember his warmth and good sense of humor. We will also remember his leadership, which created an environment so conducive to creative science and professional growth. His untimely death leaves us with a void in both our personal and professional lives that will be essentially impossible to fill.

P. CRAIG TAYLOR

University of Utah, Salt Lake City

MAX EPSTEIN

Northwestern University

Evanston, Illinois

## Philip Rosen

Philip Rosen, a professor of physics at the University of Massachusetts, Amherst, died of a stroke on 31 January 1992 at the age of 69.

After graduating from the City College of New York in 1944 with a degree in chemical engineering, Rosen went on to earn his PhD in physics from Yale University in 1949 under the direction of Henry Margenau. He was an assistant professor of physics at Rensselaer Polytechnic Institute from 1948 to 1951 and then a senior physicist at Johns Hopkins University's Applied Physics Laboratory from 1951 to 1954. He spent the next three years on the physics faculty at the University of Connecticut before coming to the University of Massachusetts, Amherst, as a professor of physics in 1957.

Rosen's research career spanned a broad range of topics, from his early work in theoretical atomic, molecular and plasma physics to the application of variational principles in thermodynamics to his later work in biophysics. In a 1953 paper on the interaction energy of three helium atoms, he demonstrated the nonadditivity of the helium-helium potential. From 1954 to 1965 much of his research dealt with electromagnetic wave propagation in plasmas and related topics. By 1968 his research had shifted to biophysics and theories of carcinogenesis and aging. Many of his papers during the next two decades dealt with radiation-induced cancers; others considered viral carcinogenesis, immunosurveillance against tumor cells and the aging of the immune system. In recent years his work focused on various cancer therapies involving hypothermia, recombinant human tumor necrosis factor,  $\gamma$ -interferon and ascorbate. In fact, just the day before he suffered his fatal stroke he mailed to the publisher his last paper, in which he proposed a regimen involving all four of these elements.

Philip Rosen was a true research scientist, eagerly following developments in his field and continually seeking a more comprehensive understanding of basic phenomena. His enthusiasm for his research was obvious even to his introductory physics students, and it was a source of inspiration and support to several physics colleagues who were broadening their own research into other areas of biophysics. He will be sorely missed by his friends and colleagues in the biophysics community.

PHILLIPS R. JONES

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