TOYOICHI TANAKA

appropriate conditions, these gels can be used for toxic waste removal or as drug delivery systems. Their mechanical properties can be exploited in artificial muscles that respond to light or in shoes that automatically conform to the shape of the wearer's foot. Toyo obtained many US patents for applications of gels and founded several companies such as GelMed and GelSciences and, more recently, Smart Gels and Buyo-Buyo Inc.

In the 1970s and 1980s, Toyo also applied the method of dynamic light scattering spectroscopy to the study of biomedical phenomena. These phenomena included measurements of the diffusion of protein molecules on the rabbit and human eye lens, diffusion of sickle hemoglobin in red blood cells, and the discovery that cold cataract was the result of binary liquid phase separation in cells of the eye lens.

In the 1990s, Toyo embarked on an ambitious and visionary program of creating "smart gels" that mimic many functions of proteins. The idea was to create gels from a mixture of different monomers (playing the role of amino acids) with the sequences of the monomers designed through a process of "imprinting." The theoretical foundations of the molecular imprinting in folding polymers were also developed by Toyo and his coworkers at MIT. The imprinted gels can selectively respond to specific target molecules and carry out catalytic or other enzymatic functions. His initial results, which confirmed that imprinted gels respond much better than their random counterparts to target molecules, point the way for future research.

These discoveries brought international recognition. In 1985, Toyo was awarded the Nishina Memorial Prize, the most prestigious physics prize in Japan. Recognized for the excellence of his physics research, he received other major prizes, such as the 1986 Award of the Polymer Society of Japan, the 1994 Inoue Prize for Science, and the 1997 Toray Prize for Science and Technology. His research also affected the broader interests of society, gaining him public recognition. In 1993, he won the Vinci d'Excellence Award and, in 1996, he won both the R&D 100 Award and the first Discover Magazine's Editor's Choice Award for emerging technology.

Toyo was a versatile, brilliant lecturer and teacher of physics, highly appreciated by his students. Thanks to his remarkable artistic gifts, he brought to his lectures vivid and beautiful hand drawings and unforgettable experimental demonstrations. Senior faculty made it a special point to attend research lectures, masterpieces of elegant exposition, in which he presented his most recent discoveries.

Toyo came from a culture dedicated to scientific excellence, in which recognition was based on merit and accomplishment, but also in which modesty was regarded as a virtue. As his accomplishments and fame grew, he remained modest, showing cordiality and friendship to his colleagues and interest in and respect for his students.

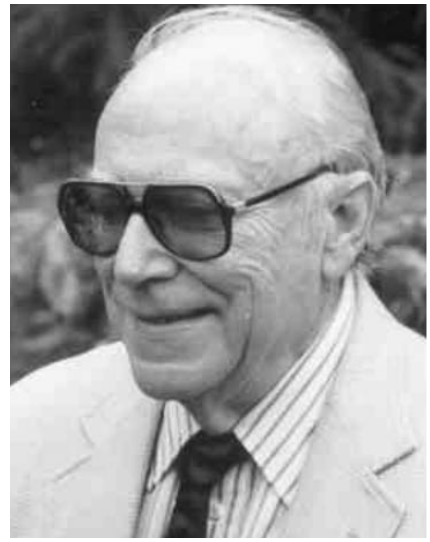
His interests were broad. He learned to speak French and Russian, and he bought a piano and learned to play it. Another interest Toyo had, which he shared with his wife Tomoko, was to form a cultural bridge between Japan and the US; Toyo served as president of the Japan Association of Greater Boston. He and his wife also were both active in the Japanese American community.

Toyo's exceptional intellect and his vivacity enriched our scientific community. The sudden passing of our beloved and admired colleague leaves us with a deep and continuing sense of loss.

GEORGE B. BENEDEK
MEHRAN KARDAR
J. DAVID LITSTER
Massachusetts Institute of Technology
Cambridge, Massachusetts

Leon Madansky

Leon Madansky, Alonzo Decker Professor Emeritus at the Johns Hopkins University, whose research interests included nuclear physics and fundamental particles, died suddenly of a heart ailment on 18 March 2000 in London, England; he collapsed after attending a play at a West End theater on the last day of a week-long vacation.



LEON MADANSKY

Madansky was born in Brooklyn, New York, on 11 January 1923. He received three degrees in physics from the University of Michigan: a BS in 1942, an MS in 1944, and a PhD in 1948. His doctoral research with Marcellus Wiedenbeck involved studies in nuclear isomerism. During his graduate education, he was an assistant in a National Defense Research Committee war project. From 1944 to 1945, he was an ensign in the US Navy, assigned to the Naval Research Laboratory to conduct research in millimeter-wave radiation.

In 1948, Madansky was appointed an instructor in the physics department of the Johns Hopkins University. He served there for the rest of his life, although he spent two sabbatical leaves (in 1969 and 1974) at CERN on Guggenheim and NSF fellowships.

Madansky was active in research in nuclear, condensed matter, and particle physics. In 1950, he and his Hopkins colleague Franco Rasetti introduced the idea of forming beams of thermal-energy positrons. Their idea revolutionized low-energy positron research in the study of solids, surface, and atomic physics, and their hypotheses about positronium formation and positron diffusion were demonstrated in the decades that followed.

In 1964, Madansky and his Hopkins colleague George Owen established the feasibility of producing negative hydrogen and deuterium ion sources, in which the metastable atoms are polarized and then ionized. This work effectively opened up opportunities for subsequent research with polarized proton beams, a subject in which Madansky maintained an interest.

Madansky served as department chairman from 1965 to 1968; during that period, Hopkins started its now-thriving astrophysics program. In addition to his work at Hopkins, Madansky spent many summers conducting research at SLAC. He was also a scientist at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory (BNL), where he was a member of the Solenoid Tracker at RHIC (STAR) collaboration.

In 1980, in his work at the BEVALAC at Lawrence Berkeley Laboratory, Madansky used the power of highly segmented arrays of almost 4π solid-angle detectors in heavy-ion physics to characterize central collisions. With this equipment, he made the first measurements of neutral pion production with Tim Hallman, his graduate student at the time. Madansky energetically advocated dilepton measurement as the signal of the early hard-scattering stage of collisions. This measurement was first implemented at the BEVALAC in the early 1980s and now incorporated in the HADES experiment at GSI, a heavy-ion research center in Darmstadt, Germany, and the PHENIX experiment at the RHIC.

In 1989, Madansky also pioneered another unique research technique in relativistic heavy-ion collisions at the BNL Alternating Gradient Synchrotron (AGS): the use of lambda polarization as a probe of the origin of strangeness production, which is thought to be a sensitive indicator of the possible transition in heavy-ion collisions from hot hadronic matter to a deconfined quark–gluon plasma. Madansky, who was always fond of polarization as a unique tool in particle and nuclear physics, was the first to make feasibility measurements to test the possibility of making this measurement, and in fact, he measured the first lambdas observed in relativistic heavy-ion collisions at the AGS.

In the early 1990s, Madansky was a major force behind the addition of the electromagnetic spectrometer in STAR for the study of spin physics with polarized proton beams. This concluded his study of polarization phenomena, which began with his efforts to produce polarized proton beams in the 1960s.

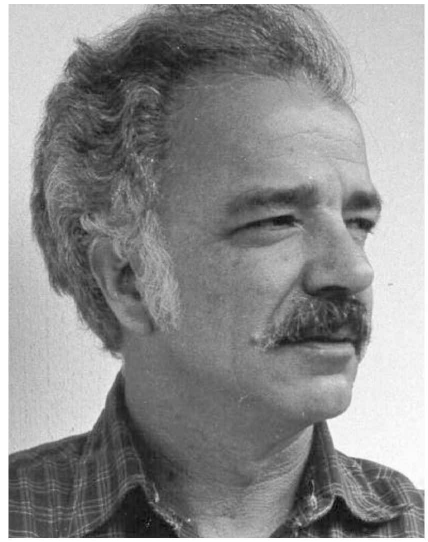
His long-term interest was in the development of experimental methods, especially particle detectors. As early as the 1940s, he worked on parallel plate detectors, the precursors of the spark chambers of the 1960s.

Popular with faculty and students, Madansky was instrumental in hiring many of the leading staff members of the department. A man of vision who started a number of the department's programs, he passed on his knowledge by describing the latest results and challenging listeners to think about the questions those results raised. He was one of the most intuitive of physicists in a number of fields—a true generalist. He would ask colleagues about their current work and ideas and suggest additional research. Although he frequently provided seminal ideas, he would be reticent about being part of the publications that incorporated those ideas.

Madansky was a good conversationalist and a highly cultured man who enjoyed the arts. He was an amateur painter and often spent free time at art museums. He attended plays and the opera, particularly enjoying the music of Verdi and Puccini. He will be sorely missed by us all.

Yung K. Lee
Thomas Fulton
Gordon Feldman
The Johns Hopkins University
Baltimore, Maryland

Virgilio Beltrán-López



Virgilio Beltrán-López

Virgilio Beltrán-López, Distinguished Professor Emeritus of physics with the Institute for Nuclear Sciences at the National Autonomous University of Mexico (UNAM) in Mexico City, died on 26 May 2000 after a long struggle with cancer.

Born on 2 March 1932 in Puebla, Mexico, Virgilio obtained bachelor's degrees in both physics and engineering at the University of Puebla in 1955, a master's degree in philosophy from Lehigh University in 1957, and a PhD in physics from Yale University in 1961.

Virgilio was a leading member in the group of young scientists who rode the crest of the mid-20th-century wave of enthusiasm for physics. Having been prepared by his undergraduate professors at Puebla, he attacked graduate school with energetic devotion. Only four years after having come to Yale to work under the direction of Vernon Hughes, Virgilio presented a thesis that included two experiments, either of which would have sufficed for a doctoral dissertation. The first experiment established an upper bound for the anisotropy of inertial mass, a result deemed important enough to modern cosmology to be included in the collection, *The Physical Review: The First Hundred Years* (AIP Press, 1995). The second experiment, a study of the microwave Zeeman spectrum of atomic chlorine, began Virgilio's lifelong engagement with experimental and theoretical studies of atomic magnetism.

After he finished his doctoral degree, Virgilio returned to Mexico in 1962, joining the staff of the UNAM Physics Institute. He initiated and directed an ambitious program in experimental and theoretical research and taught courses in advanced physics. He made a huge impact on physics education at the secondary level through 15 textbooks he either wrote or coauthored. In 1985, he became a professor at UNAM's Institute for Nuclear Sciences.

Virgilio was an active member of the first generation of physics professors at the National Polytechnical Institute, which recognized the importance of establishing research centers beyond the universities located in Mexico City. Following this path, in 1964, Virgilio became director of the school of sciences at the University of Puebla, where he gathered a group of colleagues who quickly became internationally recognized for their work in statistical mechanics. At Puebla, he also did spectroscopy at low magnetic fields using the methods of optical pumping and free precession. He was director until 1965; he then worked as head of a research laboratory at the Nuclear Center (a government-based research institution) and as a consultant with the Mexican Petroleum Institute.

Motivated by opportunities to undertake more ambitious experiments, Virgilio returned to UNAM in