the *American Journal of Physics*. Ed seemed particularly happy to have won the 1967 Oersted Medal of the American Association of Physics Teachers.

Ed's death takes from us a man of great wisdom and integrity, and of generosity in sharing his enthusiasm for and the pleasure of understanding the wonders of physics.

Robert V. Pound
Harvard University
Cambridge, Massachusetts

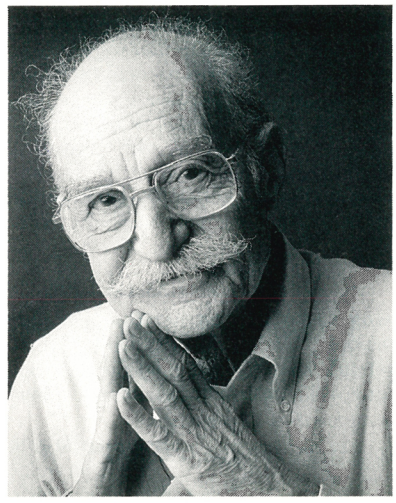
Robert Herman

Robert Herman, the L. P. Gilvin Centennial Professor Emeritus in the civil engineering department at the University of Texas at Austin, and associate director of the university's Center for Statistical Mechanics, died in Austin on 13 February 1997. During his career, Herman contributed to theoretical studies of the use of high-energy electron scattering in determining nuclear structure and to the Big Bang model of cosmology, as well as to pioneering applications of statistical mechanics and operations analysis to vehicular traffic flow.

Born in New York City on 29 August 1914, Herman earned his BS in physics from City College of New York in 1935 and his PhD in physics from Princeton University in 1940. His dissertation was on molecular structure and infrared spectroscopy. As both an undergraduate and graduate student, Herman published 18 papers on disparate topics. Throughout his career, he switched freely between theoretical and applied physics and remained very productive.

After earning his PhD, Herman spent a year at the Moore School of Electrical Engineering at the University of Pennsylvania, where he worked on early digital computers. When the US entered World War II, he joined Section T of the Office of Scientific Research and Development, which was then getting under way at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. In 1942, Section T became the Applied Physics Laboratory of Johns Hopkins University. At APL, Herman worked primarily on operations analysis of the efficacy of variable time fuzes (proximity fuzes) for rotating projectiles. After the war, he became head of a molecular spectroscopy group at APL that was largely concerned with combustion reactants, and he served for several years as assistant to the director of APL. He also did research on classical quantum mechanical problems and on problems involving color centers in alkali halide crystals.

Beginning in 1947, Herman collaborated with George Gamow and me in the development of the physics of the Big Bang model of the universe. The essence of this research was the realization that the cosmic abundances of the lighter chemical elements were formed by thermonuclear reactions in the early stages of a relativistic radiation-dominated expanding universe and that there should now exist a cosmic microwave blackbody background radiation reflecting conditions in the expansion after matter and radiation decoupled—precisely the 3 K background radiation found in 1965. In addition, Herman, James Follin Jr and I established a methodology still used today for dealing with physical conditions in the early universe.



Robert Herman

In 1955, Herman served as a visiting professor of physics at the University of Maryland. In 1956, he moved to the Research Laboratory of General Motors Corp in Warren, Michigan, where he headed both the theoretical physics and traffic science departments.

His career at General Motors was notable for two principal contributions. First, along with others, he collaborated with Stanford University's Robert Hofstadter (a fellow graduate student from his Princeton days) on studies of nuclear structure using high-energy electron scattering. These studies led to Hofstadter's winning the Nobel Prize for Physics in 1961. Second, Herman led the development of vehicular transportation science as an operations research discipline. He established a transportation science section of the Operations Research Society of America and, in 1967, founded the section's journal, *Transportation Science*, serving as its first editor. For this pioneering work, he was elected to the National Academy of Engineering in 1978. It was always startling for me to receive a preprint from Herman, with such coauthors as the late Elliott Montroll and Ilya Prigogine, in which the solution to some problem in traffic science started with the Boltzmann equation.

Herman retired from General Motors in 1979 and joined the faculty of the University of Texas. At the time of his death, he had several papers in progress—on traffic problems and on the serviceability of pavements—as well as a book on cosmology, which he was writing with me. This polymath also did research on the theory of the English flute, the measurement of pupillary diameters and the infrastructure problem in American cities. He had a one-man show of his wood sculptures at the headquarters of the National Academy of Sciences in Washington, DC. Moreover, he was a published cartoonist in PHYSICS TODAY.

Robert Herman will be sorely missed by a host of scientists in many disciplines, and by me, as I struggle to finish our book.

Ralph A. Alpher
Union College and Dudley Observatory
Schenectady, New York

Henry Margenau

Henry Margenau, a long-time member of the Yale University physics and philosophy faculties who contributed significantly to our early understanding of atomic, molecular and nuclear physics, and especially to the philosophical foundations of physics, died on 8 February 1997 in New Haven, Connecticut, at the age of 96.

Margenau was born in Bielefeld, Germany. After graduating from a "normal" school, which qualified him to teach elementary school, the 21-year-old Margenau escaped the hard times of the post-World War I German inflation by emigrating to Fremont, Nebraska. There, he worked first as a farmhand and then as a grocery store clerk. A customer at the store, the president of Midland College, finding that the young clerk had taught himself Latin and had read most of the Roman historians, arranged for Margenau to enroll at the college. The president then awarded him a bachelor's degree almost immediately (in 1924), after accepting his thesis on the philosophy of Seneca.

Margenau next enrolled as a graduate student at the University of Nebraska, where he worked as an assistant to the spectroscopist, Burton Evans Moore, even though he had never taken a course in physics or advanced mathematics. After Moore's death, Margenau completed some experimental work in Moore's laboratory, which he then published. This, the