

## DOCUMENTS OF THE GENERAL FACULTY

**REPORT OF THE MEMORIAL RESOLUTION COMMITTEE FOR  
ROBERT HERMAN**

The special committee of the General Faculty to prepare a memorial resolution Robert Herman, Professor of physics and civil engineering, has filed with the Secretary of the General Faculty the following report.

John R. Durbin, Secretary  
The General Faculty

**IN MEMORIAM  
ROBERT HERMAN**

Professor Robert Herman passed away on February 13, 1997. The world of science has lost one of its brightest stars, and his colleagues and friends worldwide mourn the loss of this Renaissance man.

Dr. Herman was born in the Bronx area of New York City on August 29, 1914. He graduated *cum laude* with special honors in physics from the City College of New York in 1935, and in 1940 was awarded master's and doctoral degrees in physics from Princeton University in the area of molecular spectroscopy.

As a graduate student Bob had already exhibited eclectic tendencies in diverse fields by also working in solid state physics, as well as straddling theory and experiment. He spent academic year 1940-41 working on the Bush Differential Analyzer at the Moore School of Electrical Engineering, University of Pennsylvania, and another year teaching physics at the City College of New York.

In 1942 he left teaching to work at the Department of Terrestrial Magnetism, the Carnegie Institution of Washington, and the Applied Physics Laboratory of Johns Hopkins University, all research centers for the war effort. He worked on such problems as the proximity fuse for naval antiaircraft gunfire, which was used effectively during the war. It was then that Bob became intrigued with defining and solving complex problems. He shifted his attention from theory and laboratory work and became deeply involved with field testing of the proximity device and the operational problems associated with its use in the fleet. In 1945, he received the Naval Ordinance Development Award.

After World War II, Bob spent another decade at the Applied Physics Lab pursuing research in spectroscopy and condensed-matter physics. It was during this period that he and Ralph Alpher did their now famous work on cosmology. In 1948, as a consequence of their studies of nucleo-synthesis in the early expanding big bang universe model, they made the first theoretical prediction of the existence of a residual, homogeneous, isotopic, blackbody radiation (microwave radiation) that pervades the universe as a vestige of the initial big bang explosion.

This work received some notice at the time, but soon fell into obscurity. In 1964, the radiation was accidentally detected by two scientists at Bell Laboratories while trying to correct a malfunction in a radio dish. After eliminating every conceivable source of interference, they concluded that the radiation source was not of earthly origin. After learning about this work, a group of physicists from Princeton University interpreted it as background radiation of cosmic origin, but without reference to the 1948 paper of Herman and Alpher. The big bang model for the origin of the universe became widely accepted, and in 1978 a Nobel Prize was awarded to the Bell scientists for their detection of the cosmic background radiation. When recalling the culmination of this series of events, Bob would remark graciously, "You don't give recognition to the person, you give it to the work."

Nevertheless, the team of Herman and Alpher were eventually recognized for their pioneering contribution. In 1993, the National Academy of Sciences announced that they would share the *Henry Draper Medal*, the oldest award of the Academy, for their contributions to astronomical physics. They were recognized "for their insight and skill in developing a physical model of the evolution of the universe and in predicting the existence of a microwave background radiation years before this radiation was serendipitously discovered; through this work they were participants in one of the major intellectual achievements of the 20<sup>th</sup> century." They also received the Magellanic Premium of the American Philosophical Society, the John Wetherill Gold Medal of the Franklin Institute, and the Georges Vanderlinden Prix of the Belgian Royal Academy.

In 1956, Bob joined the General Motors Research Laboratory as head of the basic science group, later renamed the theoretical physics department. He introduced science into the affairs of his employer by inventing a new science, traffic science. Drawing upon his background in physics, he first directed his attention to the description of the microscopic behavior of traffic: the detailed manner in which individual drivers avoid coinciding with each other in space and time, at least most of the time.

In the late 1950s and early 1960s, Bob joined with the late Elliott Montroll and others in developing the car-following theory of traffic flow, a theory that has stood the test of time and is still the state of the art today. Shortly thereafter, he and Ilya Prigogine, now a Nobel Laureate, developed a theory of multilane traffic flow. For more than thirty-five years, Bob moved into diverse fields of traffic science, always leaving his characteristic mark of excellence. In recent years, he worked with his students and colleagues to develop a "two-fluid model of town traffic," a description of vehicular traffic on urban road networks, an extension of the theory that he formulated with Prigogine some years before. This theory, along with his earlier work, has been significant in the development of the now-emerging Intelligent Transportation Systems concept.

In 1979 Bob joined the faculty of the University of Texas at Austin with a joint appointment as professor of physics, in the Center for Studies in Statistical Mechanics, and the L.P. Gilvin Professor in Civil Engineering. At the time of his death, he was the L.P. Gilvin Centennial Professor Emeritus in Civil Engineering.

Throughout his scientific life, Bob's hallmark was exploring new frontiers in diverse fields of science. He excelled in so many fields that it is difficult to do justice to all his achievements. He explored the far reaches of the universe and also investigated the structure of elemental units of matter. In his spare time, Bob was known to ponder the physics of musical instruments, such as the mechanics of a cello bow and the acoustics of the English flute. He enjoyed playing and collecting antique cellos and shared his wonder and joy with professional musicians and instrument makers.

As a boy in New York, Bob spent hours pouring over art books in the public libraries. This love of art took expression in the mid 1980s when he began creating small sculptures from exotic woods and metals. For the next decade he pursued this creative and meaningful quest to find the least-mediated, least-quantifiable relation between matter and the imagination. An exhibition of several of his carvings was presented at the National Academy of Engineering in Washington, D.C., in 1994, at the College of Engineering at the University of Texas at Austin in 1995, and at the Leu Art Gallery of Belmont University in Nashville, Tennessee, in 1996.

During the last several years of his life, Bob grew increasingly concerned, even alarmed, about the state of education in the United States, the changing yet increasingly critical role of the university in society, the increasing encroachment of political considerations on the education and research enterprise, the constant attacks on academic freedom, and the continuing erosion of the base upon which the nation's great achievements in science and technology have been attained. These were topics that would almost surely put him in a somber mood. But the conclusion of any conversation about these topics was always the same: we must go on struggling, we must remember what matters, and we must encourage students to do good work. In his last two years, he busily compiled and analyzed data on all sorts of performance indicators of quality and productivity of university departments. This was part of a broader effort to model universities as complex systems.

Bob's work would never be completely finished and his curiosity never fully satisfied. Every additional minute added to his life would have generated yet another new idea and a fresh perspective on one of the many problems that fascinated him.

Bob is survived by his wife, Helen, and three daughters. Jane B. Herman and Lois E. Herman live in Farmington Hills, Michigan. Dr. Roberta Herman lives in Austin with her husband, Dr. Ron Humphrey, and their two sons, Brandon and Parker.

This memorial resolution was prepared by a special committee consisting of Professors Clyde E. Lee (chair), C. Michael Walton, and Hani S. Mahmassani.

Distributed to the Dean of the College of Engineering, the Executive Vice President and Provost, and the President on December 7, 1999. Copies are available on request from the Office of the General Faculty, FAC 22, F9500. This resolution is posted under "Memorials" at: <http://www.utexas.edu/faculty/council/>