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**MEMORIAL RESOLUTION**  
**ROBERT HOFSTADTER**  
**(1915 - 1990)**

Robert Hofstadter, Max H. Stein Professor of Physics Emeritus, died at his home on the Stanford campus on November 17, 1990, at the age of 75. His death was due to a heart attack and followed a lengthy battle with heart disease.

Robert Hofstadter was born in New York City in 1915. He was graduated from the City College of New York in 1935 with a B.S. degree, *magna cum laude*. From 1935 to 1938 he was a graduate student in physics at Princeton University and received both M.A. and Ph.D. degrees. In his graduate work he concentrated on the infrared spectra of simple organic molecules and, in particular, on the elucidation of the structure in formic acid, now known as the "hydrogen bond." In 1939, after receiving his Ph.D., he stayed at Princeton as a post-doctoral fellow. He received the Proctor Fellowship and it was this period which saw the beginning of his life-long interest in solid state studies in luminescence and in photoconductivity. The following year was spent at the University of Pennsylvania, where he had received the Harrison Fellowship. He helped construct a large Van de Graaff generator, and he also began studying nuclear physics and thought about the particle detectors that would be necessary for any experimentation in nuclear physics.

The advent of World War II interrupted these studies. During the war Bob worked at the National Bureau of Standards on proximity fuses. Later he worked at the Norden Laboratory Corporation on servo systems, automatic pilots for aircraft, and radio altimeter devices.

In 1946, Bob returned to Princeton as an Assistant Professor of Physics, where he began serious studies of nuclear processes and particle detectors. These studies included work on the Compton effect, crystal conduction counters, scintillation counters, and the detection and measurement of gamma rays and their energies. In 1948 he made the important discovery that thallium-activated sodium iodide, NaI(Tl), made an excellent scintillation counter; and in 1950, with J. A. McIntyre, he

showed how NaI(Tl) could be used as a spectrometer for measuring gamma ray energies. This crucial discovery by Hofstadter has had far-reaching effects. This material has been in universal use as a gamma ray spectrometer ever since that initial discovery, and has been an important factor in all branches of nuclear and high energy physics, in astrophysics, as well as in medicine, biology, chemistry, geology, and many other fields. In later years, Hofstadter was to look back on his discovery of the linearity of response and high light output of NaI(Tl) as the most important contribution he made to science (in terms of its impact on a variety of fields).

In 1950, Hofstadter came to Stanford at the urging of Felix Bloch and Leonard Schiff (whom he had known earlier at Pennsylvania). He was appointed Associate Professor of Physics and immediately embarked on a program of the study of elastic and inelastic scattering of high energy electrons by atomic nuclei. This work utilized the Mark III linear electron accelerator at the High Energy Physics Laboratory. At first, when the Mark III was still being finished, the research was limited to a top energy of 200 Million Electron Volts (Mev), but eventually the maximum energy got up to its design value of 1000 Mev. These electron scattering studies continued over the next 20 years and elucidated the distribution of electric charge (and the associated magnetism) within atomic nuclei, and particularly in the alpha particle and the proton and the neutron. For the first time, the proton and the neutron were shown to be non-point particles and therefore possessed structure. For this work Hofstadter was awarded the Nobel Prize in Physics in 1961.

Hofstadter continued his interest in particle detectors. In 1968-1970 and thereafter, Hofstadter and his colleague, Dr. E. Barrie Hughes, developed new detectors for high energy physics. The "Crystal Ball", developed at Stanford and SLAC, was one outcome of this research. The Crystal Ball uncovered fundamental new results in the spectrometry of charmonium and upsilonium, new mesons containing charmed and bottom quarks. In 1970 Hofstadter introduced the idea of a large high energy gamma ray detector which would be located on a satellite in earth orbit; the purpose of such a detector would be to do gamma ray astronomy, then a field in its infancy. Much of Hofstadter's effort in the last decade was to help design, build and test the EGRET experiment, one of the four instruments on board the Gamma Ray Observatory (GRO). GRO was successfully launched in April, 1991, only a few months after Hofstadter's death.

Hofstadter often taught introductory physics courses, and he was praised by students for the clarity of his lectures. The simplicity of his teaching style was also used effectively in his upper division courses. His graduate students invariably found him to be helpful and caring. He was always concerned about his students'

welfare, and his students usually thought of him as a friend as well as their advisor. Hofstadter was active in numerous committees of the University and the Physics Department. He was appointed the Max H. Stein Professor of Physics in 1971, was Director of the High Energy Physics Laboratory (1967-1972), and served twice on the Senate of the Academic Council (1971-1972 and 1981-1983). He was an ardent supporter of Stanford athletic teams, and he enjoyed listening to music and spending time with his family on his ranch in northern California.

Hofstadter received many honorary degrees and was named California Scientist of the Year in 1959. In addition to the 1961 Nobel Prize, in 1985 he was awarded the Roentgen Medal and in 1986 was awarded the U.S. National Medal of Science and the Prize of the Cultural Foundation of Fiuggi (Italy). He was a member of the National Academy of Sciences, the American Philosophical Society, the Institute of Medicine, and the American Academy of Arts and Sciences. He was the author, or co-author, of nearly 400 scientific articles and two books.

Hofstadter is survived by his wife, Nancy, and by his three children, Douglas, Laura and Mary, three grandchildren, a brother and a sister.

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