

At a meeting of the FACULTY OF ARTS AND SCIENCES on April 7, 2015, the following tribute to the life and service of the late Norman Foster Ramsey, Jr., was spread upon the permanent records of the Faculty.

NORMAN FOSTER RAMSEY, JR.

BORN: August 27, 1915

DIED: November 4, 2011

Norman Foster Ramsey, Jr., Higgins Professor of Physics, *Emeritus*, died on November 4, 2011, at age 96. He was part of a towering group of scientists who changed the shape of Harvard's Department of Physics following the Second World War. Ramsey was widely esteemed for his scientific contributions, his achievements as a statesman of science, and his teaching. He received the Nobel Prize in 1989 for inventing the separated oscillatory field method and the hydrogen maser. He helped to found Brookhaven National Laboratory and was instrumental in the creation of Fermilab. During his six decades at Harvard University he supervised 84 Ph.D. students, and continued to teach here and elsewhere long after his retirement in 1986.

Ramsey was born in Washington, D.C., on August 27, 1915; he graduated from Fort Leavenworth High School as class president and top of his class at age 15, and from Columbia University at age 19 with a degree in mathematics and a fellowship to Cambridge University, where in two years he acquired a second B.A., this time in physics. Returning to Columbia in 1937, he joined the molecular-beam group of I. I. Rabi, in spite of the latter's admonition that the field was nearly exhausted. A few months later Rabi invented the molecular-beam magnetic resonance method and triggered a revolution in atomic physics. Ramsey's first research effort led to the discovery that the deuteron is not spherical, the first major discovery to come from Rabi's laboratory.

In 1940 Norman married Elinor Jameson and accepted a faculty position at the University of Illinois. The onset of war diverted the newly married couple to the Boston area, where for two years he led the group developing short-wavelength airborne radar at the MIT Radiation Laboratory. After a brief stint advising War Secretary Stimson (during which the Air Force's skeptical view of radar evolved to enthusiasm), Ramsey joined the Manhattan Project at Los Alamos, where he headed the delivery group.

After the war Norman returned to Columbia as a tenured professor, where with Rabi he set about revitalizing the physics department. They set their sights on access to a nuclear

reactor, an objective shared with other northeast universities, including Harvard and MIT. Nine universities joined in a consortium, for which the single seriously divisive issue was the location of the new laboratory. By a combination of patience, good humor, and relentless logic, Norman brought the contentious group to agree on a site on Long Island, which became Brookhaven National Laboratory. In 1947 Norman came to Harvard where he developed a program of theoretical and experimental research on magnetic interactions in molecules that led to his invention of the separated oscillatory field method, a technique important to the creation of precise atomic clocks, modern spectroscopy, and contemporary research in quantum physics. The hydrogen maser, another Ramsey invention, is to be found in most time-standard laboratories and lies at the heart of the global positioning system.

Beginning in 1958 Ramsey served as the first science adviser to NATO, initiating programs for advanced study institutes, fellowships, and research grants that helped to restore European physics from the effects of war. As a scientific statesman, Ramsey is widely credited for his decisive role in the creation of Fermilab. To deal with conflicting visions, 25 universities formed the Universities Research Association (URA), with Ramsey its president. His unique background as an atomic physicist who was also conversant with particle physics, his sterling reputation for fairness and accuracy, and his reputation for personal judgment uniquely qualified him for the job. Ramsey quelled a simmering scientific civil war between the East and West Coasts, served as an effective spokesman to the U.S. Congress, and oversaw the entire creation of Fermilab. The accelerator was completed ahead of schedule, below cost, and with higher energy than initially planned. And when a scientific committee was established to investigate the acoustic evidence in the Kennedy assassination, Ramsey was appointed its chair.

Ramsey made a strong impression on most everyone he met. A handsome, tall man with a broad smiling face and an open and friendly manner, he had a booming voice and loved to tell stories. To students and colleagues, Ramsey was a role model for scientific integrity. He was meticulous about allocating credit: when introduced as the father of the atomic clock, he would scrupulously point out that the clock was originally proposed by Rabi, the first atomic frequency standard was developed by Essen and Parry in England, and the first practical atomic clock was created by Zacharias at MIT.

During the McCarthy era Ramsey spoke out to defend intellectual freedom in the case of his colleague Wendell Furry, a victim of the Senator's witch-hunting. Furry was indicted, and several of the Harvard overseers called for his dismissal. Ramsey, along with Robert Pound, successfully defended Furry within the university, but the public charges by McCarthy were unrelenting. Ramsey responded on a national TV news program with a defense so persuasive that McCarthy offered him a job.

Ramsey's energy was legendary—he might fly from Cambridge to Washington for a morning meeting, exploit the time difference to get to Chicago for an afternoon URA meeting, return to Cambridge in the evening, and be up early the next morning to teach and conduct his legendary weekly group meeting. Norman hiked enthusiastically and traveled extensively, usually with his family, his students, or his many friends around the world. At age 81 he walked across England, and in his nineties he visited both the Antarctic and the Arctic, including a wilderness adventure in Alaska.

In addition to the Nobel Prize, Ramsey's many awards included the National Medal of Science and six honorary degrees. After the death of his first wife, Elinor, he married Ellie Welsh. Their combined family includes seven children and eight grandchildren. Even as Ramsey's health declined in his final years, his cheerful disposition and optimistic outlook never deserted him. As one of his students put it, Norman Ramsey was a role model for practically everything.

Respectfully submitted,

Howard Georgi
Gerald Holton
Roy Glauber, Chair

We are indebted to our MIT colleague (and former Ramsey graduate student) Daniel Kleppner for his major contributions to this piece.