To notify the community about a colleague's death, subscribers can visit http://www.physicstoday.org/obituaries, where they can submit obituaries (up to 750 words), comments, and reminiscences. Each month recently posted material will be summarized here, in print. Select online obituaries will later appear in print.

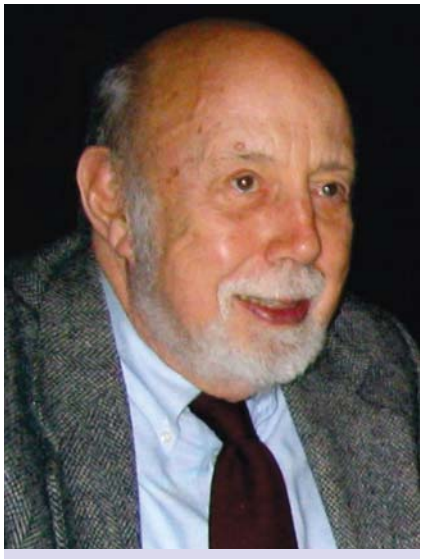
Frank Bethune McDonald

Frank Bethune McDonald, a pioneer of space research and exploration, died on 31 August 2012; he collapsed after a presentation he'd made at a University of Michigan scientific symposium. Frank studied energetic particles in space up until his death. Many of his enduring contributions are associated with his long career at NASA, where he encouraged and supported a broad range of scientific missions and collaborations.

Born on 28 May 1925 in Gastonia, North Carolina, Frank grew up in the South during the Depression. He enlisted in the US Navy in 1943. After three years of active duty at sea, he enrolled at Duke University, where he graduated Phi Beta Kappa in 1950 with a degree in physics.

Frank then began graduate studies in physics under the direction of Edward Ney at the University of Minnesota. He quickly established himself there as a bit of a hell-raiser but also as an innovative and careful experimentalist. Ney and his graduate student Phyllis Freier, using photographic emulsions, had just discovered the presence of heavy nuclei in galactic cosmic rays. At the same time, high-altitude balloons had been developed by the Office of Naval Research, General Mills, and the university. In designing his own balloon-borne instrument, Frank moved away from emulsions and instead used a cloud chamber and scintillator detector. For his PhD thesis, he conducted balloon flights at different geomagnetic latitudes and used Earth's magnetic field as a momentum analyzer to measure the energy spectrum of primary cosmic-ray alpha particles. He received his PhD in 1955 and then took a postdoctoral position at the University of Iowa under James Van Allen.

At Iowa, he collaborated with William Webber and developed a balloon-borne Cherenkov and scintillator detector telescope. Those electronic detectors were exactly what were needed for spacecraft instrumentation. By contrast, photographic emulsions had no time information and required retrieval for scanning, which made them impractical for spacecraft.



Frank Bethune McDonald

In October 1957 the Russians embarrassed the US at the peak of the cold war by launching *Sputnik 1*. In 1959 NASA recruited Frank to help bring the US into the space age as rapidly as possible. As head of the energetic-particles branch at the newly established Goddard Space Flight Center in Greenbelt, Maryland, Frank created the Interplanetary Monitoring Platform (IMP) spacecraft program to chart radiation hazards posed to astronauts by solar flares and galactic cosmic rays. Frank insisted that the project have a strong emphasis on scientific discovery, which led to one of the most productive series of scientific satellites in NASA's history.

Frank was project scientist for *Explorers 12* and *14* and the first six IMPs and was a principal investigator on all eight IMPs and *Pioneers 10* and *11*. *Voyagers 1* and *2*, launched in 1977 and now at 124 AU (18.6 billion kilometers) and 102 AU from the Sun, respectively, still return data from instruments mostly built at Goddard under Frank's guidance. In late July 2012, *Voyager 1* obtained the first evidence of a new boundary in the solar system. *Voyager 1* abruptly entered a new region of space in late August 2012, but it is still unclear whether it has reached interstellar space.

From 1970 to 1982 Frank was the chief of Goddard's Laboratory for High Energy Astrophysics. Concurrently, he was a part-time professor at the University of Maryland, where he taught core undergraduate and advanced graduate courses in astrophysics and cosmic-ray physics. Eighteen Maryland students received their PhDs under his supervision at Goddard. In 1982 Frank went to NASA headquarters in Washington, DC, as NASA's chief scientist, a position he held for five years before returning to Goddard. In 1989 he became senior research scientist in the Institute for Physical Science and Technology at the University of Maryland, where he spent the rest of his career analyzing energetic particle data from *Pioneers 10* and *11* and *Voyagers 1* and *2*, the first four spacecraft to have enough energy to escape the solar system. He and Ken McCracken used cosmogenic nuclei to trace solar activity over the past 10 000 years.

Frank's influence extended far beyond the study of energetic particles in space. He developed a program to research astrophysical x rays and created the x-ray branch at Goddard in 1970 under the leadership of Elihu Boldt. He also formed groups at Goddard to study cosmic gamma rays and IR emission. The IR emission group led to the *Cosmic Background Explorer* and other IR missions. *COBE* made detailed studies of the 3-K background emission, a remnant of the Big Bang. John Mather, who was hired by Frank, was a corecipient of the 2006 Nobel Prize in Physics for his work on *COBE*.

Recently posted notices at http://www.physicstoday.org/obituaries:

Heinrich Rohrer
6 June 1933 – 16 May 2013

George William Gray
4 September 1926 – 12 May 2013

Joseph Charles Farman
7 August 1930 – 11 May 2013

Lyman Thomas Aldrich
28 June 1917 – 1 May 2013

Paul William Zitzewitz
5 June 1942 – 30 April 2013

Donald D. Tolbert
11 January 1940 – 29 April 2013

Louis Henry Deiterman
14 December 1932 – 25 April 2013

Randall Collins Furlong
19 February 1958 – 19 April 2013

Henry Blosser
16 March 1928 – 20 March 2013

Howard R. Kratz
2 November 1916 – 14 March 2013

Neil Evan Shafer-Ray
29 November 1963 – 26 December 2012

Ioan Gottlieb
21 January 1929 – 2 September 2011

Frank established enduring friendships with talented, dedicated scientists, engineers, and technicians. He engaged his friends and colleagues in new projects and continued his work right up to his death. He had a healthy disrespect for authority and followed the rule "Proceed until apprehended" with great success. Also known as NASA's "chef scientist," he loved to entertain and cook for a houseful of colleagues and friends. The last such occasion was just a week before he died.

Tycho von Rosenvinge
Goddard Space Flight Center
Greenbelt, Maryland
Michael Coplan
University of Maryland
College Park

Robert Coleman Richardson

Robert Coleman Richardson, the Floyd R. Newman Professor of Physics and senior vice provost for research emeritus at Cornell University, died on 19 February 2013 in Ithaca, New York, following a heart attack.

A scientist with remarkable talents in the laboratory and on the national and world stages, Bob approached problems with vigor and enthusiasm. His work ethic, broad interests, and depth of understanding led to an exemplary career. He received numerous honors and awards, including the 1996 Nobel Prize in Physics for the discovery of superfluid helium-3 in 1972, along with Douglas Osheroff, then a graduate student, and one of us (Lee), a fellow professor at Cornell. The trio was also awarded the Institute of Physics's 1976 Sir Francis Simon Memorial Prize and the American Physical Society's 1981 Oliver Buckley Prize in Condensed Matter Physics.

Bob was born on 26 June 1937 and grew up in Arlington, Virginia. He attended the Virginia Polytechnic Institute, where he earned bachelor's and master's degrees in physics before serving for six months in the US Army Ordnance Corps. Following military service, he enrolled in the graduate physics program at Duke University, where he performed pulsed nuclear magnetic resonance (NMR) experiments on solid ^{3}He for his 1965 PhD in physics; Horst Meyer was his adviser. Bob's thesis work involved landmark studies on exchange effects between ^{3}He nuclear spins. His research provided an understanding of that system and gave hope that a possible nuclear magnetic phase transition would occur at lower temperatures.

LINDSAY FRANCE/CU

Robert Coleman Richardson

Following his time at Duke, Bob joined the low-temperature physics group at Cornell as a research associate and in 1968 became an assistant professor. When he arrived at Cornell, a program to study liquid and solid ^{3}He via Pomeranchuk cooling was just getting under way. The method could reach temperatures below 1 mK by adiabatically compressing liquid ^{3}He into the solid phase.

Bob was a skilled experimenter with keen analytical abilities and enormous energy. He was often around the laboratory in the evenings, providing help and advice to graduate students, and thus served as an excellent role model. He made great contributions in early experiments that used Pomeranchuk cooling, including continuous-wave NMR magnetic susceptibility studies of solid ^{3}He and pulsed NMR studies that provided the first experimental demonstration of the spin-diffusion behavior, known as the Leggett–Rice effect in liquid ^{3}He. Then one night in late November 1971, Osheroff observed small anomalies along the ^{3}He melting curve. From then on, it was difficult for anyone to stay away from the laboratory.

At the time of those observations, the combination of extremely pessimistic predictions by various theorists and the failure of John Wheatley's group to observe superfluid ^{3}He using adiabatic demagnetization had given Bob and his fellow researchers reason to despair of finding it at any attainable temperature. That influenced the team members, who had to consider whether the observed effects were associated with the liquid or with the solid present in the