Boyce Dawkins McDaniel FREE

Special Collection: Print Obituaries

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In Brief

After 26 years at Bell Laboratories in Murray Hill, New Jersey, most recently as vice president of physical research, **Federico Capasso** joined Harvard University last month as Gordon McKay Professor of Applied Physics and Vinton Hayes Senior Research Fellow in Electrical Engineering.

During a ceremony in Munich, Germany, in December, the European Commission awarded the 2002 Descartes Prize to two international research groups, one of which does physics-related work. An astrophysics team consisting of scientists from eight countries and led by **Edward van den Heuvel** of the University of Amsterdam was cited for "solving what has been for 30 years one of the greatest mysteries of astrophysics: the places of origin of the Gamma Ray Bursts." The team split the € 1 million prize with the other winner, a team pursuing medical research.

Jim Breckinridge joined the Jet Propulsion Laboratory's Washington, DC, office last fall as the theme technologist of NASA's Astronomical Search for Origins Program, which seeks to answer the questions, Where do we come from? Are we alone? He spent the past three years at NSF in Arlington, Virginia, as program director for advanced technology and instruments and as program manager for the National Radio Astronomy Observatory in Charlottesville, Virginia.

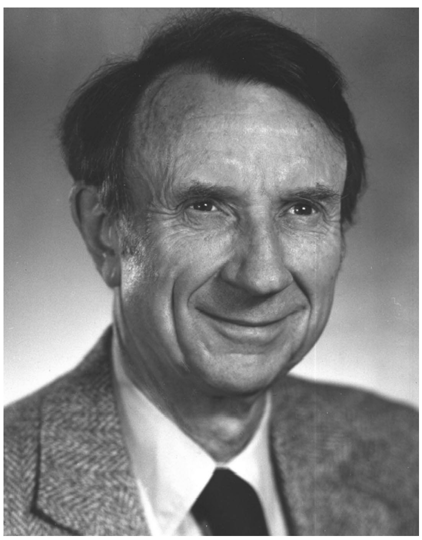
At a ceremony in Washington, DC, in December, **Katharine B. Gebbie** was among nine federal employees honored with a Service to America Medal, given jointly by the Atlantic Media Group and Partnership for Public Service. Gebbie, director of NIST's Physics Laboratory in Gaithersburg, Maryland, received the 2002 Career Achievement Medal, in part for being "the founding director of the award-winning NIST Physics Laboratory" and for being "a pioneer in the practical application of emerging technologies." She also was recognized for having "helped enhance scientific career opportunities for women and minorities through a lifetime of service." She received a $5 000 cash prize. Service to America Medals, given for the first time in 2002, are presented annually to recognize federal workers' achievements.

Obituaries

Boyce Dawkins McDaniel

Boyce Dawkins "Mac" McDaniel died from cardiac arrest on 8 May 2002 at his home in Ithaca, New York. For more than half a century, Mac played a leading role in the birth, development, and mature phases of accelerators and experimental particle physics. Throughout his career, his time was seamlessly divided—often on a daily basis—among administration, accelerator physics, instrumentation, and particle physics.

Mac was born on 11 July 1917 in Brevard, North Carolina. He graduated from Ohio Wesleyan University with a BA in 1938. Two years later, he received his MA in physics under Eugene Crittenden at the Case School of Applied Science (now Case Western Reserve University) in Cleveland, Ohio. He then entered a PhD program at Cornell University. There, as a student of Robert Bacher from 1940 to 1943, he built a multichannel, high-resolution time-of-flight energy spectrometer, which he used to carry out precision measurements of the energy levels of indium for his thesis. Following the completion of his PhD, Mac accepted a postdoctoral position at MIT, where he learned to apply techniques of the rapidly evolving field of fast electronics to particle physics research.


Boyce Dawkins McDaniel

After only a few months in Cambridge, Massachusetts, Mac was recruited by telephone to join a secret government project. Without any knowledge of its nature and location, Mac abruptly pulled up stakes and joined the Manhattan Project in Los Alamos, New Mexico, where there was a pressing need for accurate measurements of neutron cross sections. Using the neutron spectrometer he had developed for his PhD thesis, Mac led the Los Alamos research team that soon discovered and made accurate measurements of fission induced by the resonant absorption of epithermal neutrons in uranium and plutonium. That work was an important contribution to the design of the first nuclear bombs. Subsequently transferred to a group set up to assemble the bomb, Mac played a key role in the test of the first plutonium bomb near Alamogordo, New Mexico.

After World War II, Mac returned to Cornell to take charge of the 2-MeV proton cyclotron built by Stanley Livingston before the war. Mac studied the energy levels of light nuclei by measuring the gamma-ray spectra emitted from elements bombarded by protons. To do so, he needed to measure the gamma-ray energies more accurately than was possible with existing detectors. In his characteristic style, Mac, together with Robert Walker, invented the pair spectrometer in 1948; for many years, it was the best available instrument for measuring gamma-ray energies.

Mac was instrumental in establishing, in 1946, the Cornell Laboratory of Nuclear Studies (CLNS), and played a leading role in designing and building the 300-MeV electron synchrotron that, on its completion in 1949, was one of the first such accelerators in the world. Over the next 20 years, Mac and his colleagues, in a group led by Robert Rathbun Wilson (see PHYSICS TODAY, April 2000, page 82), built three more electron synchrotrons of successively higher energies, each of which enabled physicists to study phenomena in a new energy range. Each accelerator was a masterpiece of technology, built rapidly and economically by a small team of physicists. Mac was key to the construction of each machine and brilliantly completed the construction of the last one: the 10-GeV synchrotron.

After a decade as the associate director of the CLNS, Mac became its director in 1967, and remained in that position until he retired from the Cornell faculty in 1985. In addition to his administrative responsibilities, he continued an active research program. He pioneered the technique of tagged gamma rays and performed important measurements with each of the accelerators, including work in K meson and λ meson photoproduction, and neutron electromagnetic form factors.

In 1972, Mac took a one-year leave

from Cornell to serve as acting head of the accelerator section at Fermilab. Although the accelerator had operated at a near-design energy, frequent component failure and intermittent operation made it a difficult time for both the lab and the particle physics community. Mac threw himself into the fray with his usual enthusiasm. Thanks to his leadership, by the end of the year the accelerator was working as it should. According to Wilson, who directed Fermilab at the time, “this bravura performance demonstrated Mac’s skill for leadership as well as his celebrated sixth sense for finding sources of trouble and fixing them.”

In November 1974, Mac sensed that the discovery of the J/ψ, the first charmonium meson, signaled an abrupt change in the frontier of particle physics research. With a bold stroke, he convinced his colleagues to abandon their program of electron synchrotrons of ever-increasing energy and instead upgrade the existing 10-GeV synchrotron into an 8-GeV electron–positron collider using the synchrotron as an injector and adding a storage ring in the same tunnel. That radical and risky proposal, if it worked, would significantly reduce the cost and construction time and make its funding possible. Mac convinced NSF to support the project and threw himself heart and soul into the job of making it work. The gamble succeeded, and the rich treasure trove of 25 years of b-quark physics that it uncovered was the ultimate reward for the daring, innovative, and low-cost style of physics practiced by Mac, Wilson, and their Cornell colleagues.

After his retirement in 1985, Mac remained active at CLNS and played important roles in both the Cornell Electron Storage Ring and the CLEO collaboration. In addition, he served on many advisory and visiting committees for NSF and the US Department of Energy. He was a trustee of the Associated Universities (1963–75) and Universities Research Association (1971–77); a member of the DOE’s High Energy Advisory Panel (1975–78); and a member of the Superconducting Supercollider Board of Overseers (1984–91), which he chaired for part of this period. He was elected to the National Academy of Sciences in 1981. His modesty, integrity, and sound judgment, and his passion for life, physics, and making things work were widely recognized and admired by the scientific community.

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Gordon James Stanley

Gordon James Stanley, one of the pioneers of radio astronomy, died on 17 December 2001 in Monterey, California, of complications from progressive supranuclear palsy.

Stanley was born in Cambridge, New Zealand, on 1 July 1921, and, at age six, moved with his parents to Australia. He completed his engineering studies at Sydney Technical College, now part of the University of New South Wales, and received the degree of Associate of the Sydney Technical College in 1945.

In 1945, he joined the receiver group of the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) Radiophysics Laboratory, where he developed some of the earliest equipment used to study the radio emission from the Sun and the Galaxy. He teamed up with John Bolton and Bruce Slee in 1947 for a series of novel experiments to make the first accurate measurements of radio source spectra. The team convincingly demonstrated the nonthermal nature of cosmic radio noise, which later was understood to be synchrotron radiation from energetic electrons spiraling in weak cosmic magnetic fields. But as the celestial coordinates of the radio sources were not well determined, there were no known optical counterparts to the increasing number of cosmic radio sources being detected.

During World War II, shipboard radar operators sometimes noticed that the return signals from airplanes flying close to the horizon showed an interference pattern. The reflected signal from the surface of the ocean combined with the direct signal to give alternately constructive and destructive interference as the angle to the aircraft changed. Stanley, together with Bolton and Slee, exploited that effect using sea interferometers on cliffs along the coasts of Australia and New Zealand to measure the size and accurate position of four strong radio sources. This work led to their identification in 1949 of one of those sources with the Crab nebula. Two of the other sources were identified with galaxies located beyond the Milky Way. It was difficult for Bolton, Stanley, and Slee to accept the enormous radio luminosity implied by their results, and it would be several years before the astronomical community would acknowledge the extragalactic nature of radio stars.

Nearly all of the early investigations in radio astronomy were pursued by scientists who, like Stanley,

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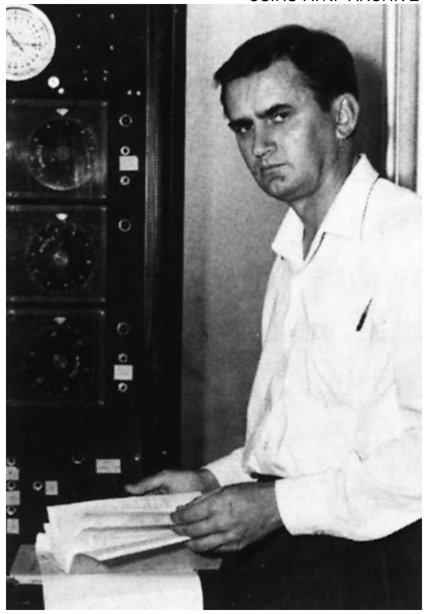

Gordon James Stanley

had a strong background in radio and electronics rather than in astronomy. But the sea interferometer observations attracted the attention of astronomers—such as Jan Oort in the Netherlands—and astrophysicists, and marked the beginning of modern radio astronomy.

Stanley left Australia in 1955 to join Bolton, who had been asked to start a radio astronomy program at Caltech. Following what he later described as a “frustrating search” throughout southern California for a site free of manmade radio interference, Stanley found the ideal location for a radio telescope in the Owens Valley. In 1955, he developed the first radio interferometer operating above a few hundred megahertz and earned a reputation as someone who could design, build, and fix just about anything that involved electronics. His low-noise receivers, which were affectionately known as Stanley Steamers, made the Caltech interferometer the most sensitive radio telescope in existence at the time. He taught me how to repair a noisy receiver by tapping the 1N21 diode mixer with a hammer or, if no hammer was available, by throwing the diode on the floor. Most of the time, this resulted in the diode’s not working at all, but in a few cases, the original very-low-noise performance was miraculously restored.

From 1961 to 1975, Stanley directed the research at the Owens Valley Radio Observatory. The precise measurements of radio source positions with the OVRO interferometer led to the identification of new and increasingly distant radio galaxies and the discov-