

Boyce Dawkins McDaniel

June 11, 1917 — May 8, 2002

Boyce Dawkins McDaniel, a widely recognized and universally respected leader of the international particle physics community, died at his home at Kendal in Ithaca, New York. Mac (the only name by which he was known to his wide circle of friends, family, colleagues, and admirers) was born in Brevard, North Carolina, the youngest of the three children of Allen and Grace McDaniel. His family was poor, and at an early age, Mac learned lessons of responsibility, dedication, and dealing with adverse and changing circumstances that would serve him well, both personally and as a leader, for the rest of his life.

Mac completed high school in Chesterville, Ohio in 1933 and entered Ohio Wesleyan University, where he financed his education with a series of part-time jobs. He graduated in 1938 with the goal of becoming a diesel engineer. He went on to what is now Case Western Reserve University, but was disappointed to find diesel engineering beyond his reach given his undergraduate liberal arts degree. He settled on physics, and received his M.A. degree in 1940. Mac was excited by the rapidly unfolding field of nuclear physics, and immediately entered a doctoral program in physics at Cornell.

As a graduate student of Robert Bacher at Cornell from 1940-43, he built one of the world's first neutron time-of-flight energy spectrometers, and used it to make precision measurements of the energy levels of indium for his thesis. He initially supported himself by exchanging custodial services for lodging in the attic of Rockefeller Hall. In what little spare time he had, he met and courted Jane Chapman Grennell, a fellow Cornell graduate student in history. They were married in 1941, and were loving partners for the rest of his days.

After receiving his Cornell Ph.D. degree, Mac accepted a prestigious post-doctoral appointment at M.I.T., and he and Jane moved to Cambridge, Massachusetts. Their stay in Cambridge lasted only a few months. Mac received a phone call asking him to leave M.I.T. to join a secret government project at an undisclosed location. Without any knowledge of the project's nature and location, Mac and Jane abruptly pulled up stakes and joined the Manhattan project in Los Alamos, he as a Research Physicist and she as a Laboratory Technician.

The neutron spectrometer he had used for his Ph.D. thesis at Cornell was needed in the Manhattan project. He supervised its removal to Los Alamos, and led a research team there that made accurate measurements of the epithermal resonances in the fission of uranium and plutonium. These measurements were important in the design of the first atomic bombs.

After the war, he returned to Cornell University, where he carried out important work in gamma ray spectroscopy. Together with Robert Walker, he invented the pair spectrometer, which for many years was the most important tool for measuring gamma ray energies. He was instrumental in establishing the Cornell Laboratory of Nuclear Studies, and had a leading role in designing and building the 300 MeV electron synchrotron, one of the first such accelerators in the world. Over the next twenty years, he and his colleagues, led by R.R. Wilson, built three more electron synchrotrons of successively higher energies, each of which enabled physicists to study phenomena in a new energy range. Each of these accelerators was a masterpiece of technology, built rapidly and economically by a small team of physicists. Mac played a leading role in the construction of all of these accelerators, and brilliantly completed the construction of the last of these accelerators, the 10 GeV synchrotron. He became Director of the Laboratory of Nuclear Studies in 1967, and remained in that position until he retired from the faculty in 1985. He pioneered the technique of tagged gamma rays, and performed important measurements with each of these accelerators, including a long series of work in K-meson and Lambda-meson photoproduction and measurements of the neutron electromagnetic form factors.

In 1972, he took a one-year leave from Cornell to become acting head of the accelerator section at Fermilab. This was a very difficult time for Fermilab and the entire particle physics community. Though the accelerator had operated at a near design energy, component failure was frequent and operation intermittent. 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 R.R. Wilson, the Director of 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 1974, it had become clear to all that the Laboratory of Nuclear Studies course of electron synchrotrons of ever increasing energy had reached its end. But the proper future course for the Laboratory was far from clear. With a bold stroke, Mac proposed upgrading the existing 10 GeV synchrotron into an 8 GeV electron-positron storage ring. This radical but risky proposal, if it worked, would reduce the cost and construction time by a large factor; just enough to make its funding possible. Mac convinced the National Science Foundation to support the project, and threw himself heart and soul into the job of making it work. That it worked at all was miraculous, but not even Mac dared hope for the rich treasure trove of science that it would uncover. For more than 25 years, this storage ring has been the world's leading source of information about the b quark, one of the fundamental building blocks of matter. As a result, Cornell has been one of this generation's leading centers of research in the field of particle physics.

Mac served in numerous leadership roles in the national physics community. He was a trustee of the Associated Universities; a member of the governing board of Brookhaven National Laboratory; a member of the Department of Energy High Energy Advisory Panel; a trustee of the Universities Research Association; a governing board member of Fermilab; and chair of the Superconducting Supercollider Board of Overseers. He had a Fulbright grant to the Australian National University as well as Fulbright and Guggenheim grants to the University of Rome and to the Synchrotron Laboratory in Frascati, Italy. He was a member of the National Academy of Sciences, and held the Floyd R. Newman Chair of Nuclear Studies at Cornell.

Karl Berkelman, Albert Silverman, Peter Stein