

OBITUARIES

Charles B. Duke

Charles B. Duke, a remarkably versatile theoretical physicist, passed away on 28 June 2019 in Webster, New York. Charlie's contributions to science extended far beyond his work at Xerox Research, where he spent much of his career. A leading solid-state physicist, he did pioneering science in industry, academia, and national laboratories; held many leadership positions; launched and led prestigious scientific journals; was a consummate teacher; and volunteered extensively in service to the scientific community.

Born on 13 March 1938 in Richmond, Virginia, Charlie obtained his BS from Duke University in 1958, with majors in math and theology. In 1963, under Eugene Wigner at Princeton University, he received his PhD in physics for explaining nuclear-surface-peaked energy absorption in nucleon scattering from nuclei. That same year he became a research scientist at General Electric's Corporate Research Laboratory, applying his many-body-theory skills to solid-state physics, including the tunneling of electrons across semiconductor diodes.

In 1969 Charlie went to the University of Illinois at Urbana-Champaign, where he became one of its youngest tenured faculty members. Cementing his scientific reputation, he leveraged the understanding he had gained in his thesis work by creating a way to derive crystalline surface structure parameters from low-energy electron diffraction data. That feat took place in the early days of surface science, when preparing clean, well-characterized surfaces was non-trivial; when computers were unimaginably slow; and when there was much contention over whose ideas came first and whose numbers were most reliable. Still, Duke's results, with Charlie Tucker, George Laramore, and others, contributed substantially to establishing a database of silicon and other semiconductor surface structures that were key to characterizing the behavior of electronic materials.

In 1972 Charlie moved to the Xerox Webster Research Laboratories, rising through research management until his retirement in 2006. His contributions to Xerox included spearheading the electronic devices and materials study that

reshaped much of the corporation's R&D in the 1990s, for which he received Xerox's highest honor, the President's Award. Other notable achievements included the color imaging science thrust and the tribology and xerography initiative linking fundamental charge-transfer processes to the core processes that make Xerox machines work.

Charlie maintained strong connections to the academic community, as an adjunct professor at the University of Rochester, and by assuming pivotal leadership roles in scientific societies. He served the American Vacuum Society (AVS) as its president in 1979 and on its board, driving the group's evolution to a concentration on fundamental and applied surface science. Charlie strengthened the reputation of the society's *Journal of Vacuum Science and Technology*. He also served on the Materials Research Society Council, strengthening the organization's publication portfolio by founding the *Journal of Materials Research* and serving as its first editor-in-chief from 1985 to 1986. For over a decade, beginning in 1992, he was editor of *Surface Science* and *Surface Science Letters*, the most prestigious journals in the field.

Charlie interrupted his career at Xerox to serve in 1988–89 as deputy director and chief scientist at the Department of Energy's Pacific Northwest National Laboratory. That afforded a close-up view of the national laboratory complex, which he used to broaden his lectures and consultations on research career management.

Over his career, Charlie earned much recognition. He is one of few to be inducted into both the National Academy of Engineering (1993) and the National Academy of Sciences (2001). AVS bestowed on him its most prestigious prize, the Medard W. Welch Award, in 1977 for work on electron scattering. The American Physical Society (APS) awarded Charlie the George E. Pake Prize in 2006 for contributions to understanding tunneling in solids and electron-surface scattering and to Xerox Corp. From his retirement until his death, Charlie served as a professor of physics at the University of Rochester, where he continued to pursue broad scientific interests and also returned to studying theology.

During Charlie's long career at Xerox, he promoted the endeavors of early-career



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scientists and engineers, particularly in industrial research. To that end, from governance positions with the American Institute of Physics (publisher of *PHYSICS TODAY*) and APS, Charlie organized task forces and outreach initiatives.

With her selfless support and social graces, Ann, Charlie's wife, was integral to Charlie in sustaining his legendary work ethic.

Many of our colleagues count Charlie as an essential mentor, career counselor, and scientific critic. We three benefited immensely from his counseling and incisive critiquing over some three decades. The intensity of his intellect, force of his convictions, and sincerity of his friendship have enabled Charlie's lifelong lessons to transcend time. In his own words: "You have to find people who are doing similar things, who are going to mix it up and call each other nuts and have some real good wars and so on—get everybody to think, which is ... my philosophy of research."

What a colleague! We will sorely miss the next "war."

Leonard J. Brillson
Ohio State University
Columbus

H. Frederick Dylla
American Institute of Physics
College Park, Maryland

Peter J. Feibelman
Sandia National Laboratories
Albuquerque, New Mexico