Cambridge, where he did notable work supporting the strong group at the Mond Laboratory in superconductivity and liquid helium. With P. G. L. Kapur, he derived the dispersion formula for nuclear reactions. This had been given in perturbation theory by Gregory Breit and Eugene Wigner; the Kapur–Peierls derivation gave a general formula using complex boundary conditions on the spherical nuclear surface.

In 1937 Peierls accepted a chair at the University of Birmingham and became joint head of mathematics there (theoretical physics in Britain often being in mathematics). That was at a time when war was imminent and physicists around the world were being drawn into preparations for the conflict. The discovery of fission resulted in several independent calculations of the feasibility of explosions.

Chadwick and others in Britain estimated the amount of uranium required and found it hopelessly too large. However, Otto Frisch, a codiscoverer of fission and himself a refugee in Britain, asked Peierls whether the pure isotope uranium-235 could make an atomic bomb, and Peierls calculated that it could. A memorandum to that effect was sent in 1940 to the British Government, which, quite naturally, immediately classified it as top secret. Peierls and Frisch, as aliens, were not allowed to read the document they themselves had written! However, the government soon came to its senses and entered the race. With the entry of the US into the war in 1941, the British effort was joined with the US effort, and in 1944 Peierls (by then a British subject) moved to Los Alamos.

In 1946 Peierls returned to the University of Birmingham. Although he was offered chairs at both Oxford and Cambridge after the war, he preferred to remain at Birmingham and run the physics department on the lines of the departments where he had studied as a young man. Peierls's department flourished greatly in the postwar years.

His almost two decades at Birmingham are remembered by a large community of theoretical physicists from all over the world. Rudi Peierls always seemed to find ways of supporting people, and Genia Peierls was a kind and decisive organizer of the visitors. Their large house in Edgbaston was the center of innumerable dinners and parties at which they and their four children enjoyed the company of many remarkable people.

All aspects of theoretical physics were alive there, and the students had the privilege of meeting the top people in physics. Peierls and his coworkers published on nuclear forces and scattering, on quantum field theories, on collective motion in nuclei, on transport theory and on statistical mechanics. In this period he wrote his influential *Quantum Theory of Solids* and a popular book, *The Laws of Nature*.

His advice was much appreciated by the British Government, and he played his part in the setting up of the Harwell Laboratory, where a theoretical physics division flourished and engaged in much interchange with Peierls's department at Birmingham.

Eventually, Peierls felt the need for a change, and in 1963 he accepted the Wykeham Chair of Theoretical Physics at the University of Oxford. There he oversaw the unification of several theoretical groups into a single department of theoretical physics, which has become one of the largest and most powerful in Europe. He retired in 1974 and, after several visiting positions, lived in Oxford for the rest of his life.

This brief notice cannot possibly do justice to all his work. I recommend his autobiography, *Bird of Passage* (Princeton, 1985), and his *Surprises in Theoretical Physics* and *More Surprises in Theoretical Physics* (Princeton, 1979, 1991), which are full of physicists' humor.

His numerous students remember him with affection and regarded him as a true polymath of physics. He would never mince words when something was wrong, but always came up with something to put things right. Deeply concerned with the aftermath of wartime nuclear weapons, he strongly supported the efforts of the *Bulletin of the Atomic Scientists*, and was himself president of the Atomic Scientists' Association in the UK. He played a full part in the Pugwash movement and kept up his interest and support for it to the end of his life.

Sam Edwards
University of Cambridge
Cambridge, United Kingdom

Nicolas J. Papastamatiou

Nicolas Papastamatiou, 55, former chair of the physics department at the University of Wisconsin–Milwaukee, died of cancer on 3 September 1995. Born in Athens, Greece, he was educated at the National and Capodistrian University of Athens and then studied in the UK, where he received a PhD in physics from the University of Oxford in 1966.

Later that year Papastamatiou came to the United States to take a postdoctoral position at Syracuse University. In 1968 he was hired as an assistant professor by UWM in 1968.

At UWM, Papastamatiou collaborated fruitfully with Hiroomi Umezawa, Hideki Matsumoto and others for nearly 20 years. They formulated a fundamental and novel approach to spontaneous symmetry breaking involving the notion of the dynamical rearrangement of symmetries when Heisenberg fields are mapped to fields. Their mathematical formalism was particularly effective in describing the quantum nature of "extended objects," particle-like objects of finite extent that are constructed from quantum fields.

Papastamatiou's graduate teaching and his research reflected an exceptional facility with the mathematical techniques of quantum field theory. Known for his elegant and enthusiastic lectures, he taught the subtleties of quantum physics both to his colleagues and to a generation of UMW students.

For most of the last 16 years, he served as chair of the physics department. He was a kind and thoughtful mentor, with a gift for encouraging promising young scientists. In a century of specialization, Papastamatiou's intellectual breadth showed us some of what we have sacrificed. He was fluent in Greek, French and English, and he knew Latin, ancient Greek and German as well. He was a man with whom English teachers and writers liked to talk about poetry and fiction, and with whom musicians discussed music.

Papastamatiou never promoted himself or his own interests. His colleagues will miss his calm demeanor, his wisdom and his friendship.

John L. Friedman
Moises Levy
Richard Sorbello
University of Wisconsin–Milwaukee
Milwaukee, Wisconsin
A. P. Balachandran
Syracuse University
Syracuse, New York

Daniel Bershader

Daniel Bershader died on 30 May 1995 from complications due to chronic peptic ulcers. He served 30 years as a professor of aerophysics at Stanford University, following a part-time faculty appointment there between 1956 and 1964 while manager of gas dynamics research at Lockheed Missile and Spacecraft Co.

Born on 14 March 1923, Dan earned a BA from Brooklyn College in 1942. He went on to study physics at Princeton University, where he earned an MA in 1946 and a PhD in 1948.

In 1944–45 he was a petty officer

in the US Navy, working on underwater ordnance engineering. The Princeton physics department appointed him as an instructor in 1948–49 and a research associate professor from 1952–56. In the interim he served on the University of Maryland faculty.

Dan was an outstanding experimentalist, with particular skill in optical methods of gas dynamic research. Although his work was usually motivated by aerospace problems, he often explained that he liked to use the field as an "excuse for doing basic physics." He was a pioneer in applications of the shock tube for studying flow phenomena of many kinds. In the shock-tube laboratory, he was responsible for developing a carbon dioxide laser years before its commercial introduction. He and doctoral students produced beautiful photographs of strong vortices, for which he determined that the central-core density was less than half that of the surrounding fluid. Another recent interest of his was in acoustics, ranging from the noise created by helicopter rotors to the sounds of musical instruments. His course on the subject attracted students from all over campus.

Dan will be remembered especially for his contributions to the American Physical Society. He served as chairman of the APS division of fluid dynamics in 1977 and was on the APS executive board from 1984 to 1986.

Dan was chairman of the faculty senate at Stanford in 1971–72 and served as associate chairman of aeronautics and astronautics for nearly 20 years. From 1972 on, as director of the Summer Faculty Fellowship Program sponsored jointly by Stanford, the National Aeronautics and Space Administration and the American Society for Engineering Education, he helped hundreds of US professors to find exciting summer positions at Ames Research Center. Less formally he served as a pillar of Friday lunchtime discussions among fluid dynamicists at the faculty club and was instrumental in bringing visitors to campus from around the world.

A lover of athletics, Dan was a formidable tennis player and an avid fan of Stanford sports. A devotee of classical music, he was an accomplished pianist. He was also an expert in horticulture, and his home garden was one of Stanford's finest.

A gentle man about whom it was said "he never raised his voice in anger," Dan will be remembered as a friend, mentor and wise counselor by generations of students, colleagues and admirers from around the world.

HOLT ASHLEY

Stanford University

Stanford, California ■