

justifiably be considered the first tokamak outside Russia. When the high temperatures and excellent confinement of the Russian T-3 experiment were confirmed in 1968, interest in the tokamak configuration swept the world, and Liley's group found themselves with what was then a hot research commodity: a tokamak. Two PhD students, David Bowers and Evan Bydder, worked with Liley on LT-1, and LT-3 was the machine on which three now senior physicists in US fusion research, James Strachan, Michael Bell, and one of us (Hutchinson), learned "to drive" a tokamak.

In 1969, Liley moved to Hamilton, where he became the Foundation Professor of Physics at the new University of Waikato. Although he continued theoretical work in fusion and continued to visit the group he had started at ANU, this move marked the start of a second career. Liley built a very successful physics department, struggling hard to encourage and provide excellence, success, integrity, and growth. He was instrumental in promoting various community activities, particularly in astronomy and local industry. He was an ardent supporter of the BSc (technology) program and other industry collaboration programs that were introduced to New Zealand by the Waikato University physics department. He also was a member of the Royal Commission on Nuclear Power Generation in New Zealand (1978).

Liley will be remembered internationally as a true research physicist who was determined to tackle important problems with original ideas and a lot of hard work.

ROBERT L. DEWAR

*Australian National University
Canberra, Australia*

IAN HUTCHINSON

*Massachusetts Institute of Technology
Cambridge*

R. S. "BAS" PEASE

Newbury, UK

ALAN WARE

University of Texas at Austin

Timothy Edward Toohig

Following a meeting at SLAC, Timothy Edward Toohig died of an apparent heart attack on 25 September 2001. Before his death, Tim had been working for the US Department of Energy (DOE), monitoring the program at SLAC and at the Large Hadron Collider at CERN.

Tim was born on 17 February 1928



TIMOTHY EDWARD TOOHING

in Lawrence, Massachusetts. Following a stint in the US Army Air Corps in 1946–47, Tim entered Boston College. There, despite a long commute from Lawrence, he made time to engage in his emerging religious interests and to participate in the local physics club. He received a BS in physics at Boston College in 1951. In 1953, Tim earned an MS degree from the University of Rochester, where he specialized in optics.

Tim began his formal studies in Roman Catholicism in 1953, becoming a novitiate at Shadowbrook Seminary in Lenox, Massachusetts. In 1957, he enrolled as a graduate student in physics at Johns Hopkins University and simultaneously arranged to continue his religious studies at Woodstock College in Maryland. In due course, Tim became a member of Aihud Pevsner's research team that was engaged in bubble chamber experiments using the Bevatron at the University of California, Berkeley. During his early 1960s stay in Berkeley, Tim also became associated with students and faculty at the Newman Center. His involvement with team members in the physics experiment along with the fellowship he found in the religious community began to set a pattern for the unusual development of Tim's personality and influence, combining his talents as a scientist, a chaplain, a spiritual counselor, and a helpful friend to many.

A group at Berkeley during the early 1960s was beginning to consider a much larger accelerator that might be built in California, and Tim began to spend time on that project. In 1962, he received his PhD in elementary particle physics under the direction of his thesis adviser, Pevsner, from

Johns Hopkins; the title of his thesis was "Existence and Production of Eta and Omega Mesons." His attention returned to his religious studies at Woodstock College; in 1965, he was ordained a Jesuit priest.

Tim then joined the accelerator department at Brookhaven National Laboratory, where he assisted with the design and implementation of the slowly extracted external proton beam. He also joined a newly formed division that was created to assist experimental groups in the use of the Alternating Gradient Synchrotron. Furthermore, in his "spare time," Tim continued to work, as he had at Berkeley, on design studies for a new, higher-energy accelerator. In 1968, construction of that accelerator was authorized at a site near Batavia, Illinois. In 1970, Tim joined that project, becoming a member of the Fermilab experimental areas division.

Soon after Tim's arrival at Fermilab, his style—bringing to life new facilities, usually ahead of schedule and under budget—caught the attention of Director Robert R. Wilson, who promptly assigned him responsibility for the design and construction of the neutrino experimental area. There his work included the design and construction of a complex target and focusing system that produced the world's highest-energy neutrino beam at that time. Tim was an intrepid red-tape cutter and, when necessary, a consummate circumnavigator of burdensome and counterproductive rules. He even found a creative way to get Wilson his desired reflecting ponds by making them part of the Fermilab accelerator's cooling system.

Tim was a major participant in a US–Soviet experiment on the channeling of charged particle beams, a collaboration that started at Fermilab and later moved to Dubna and Serpukhov in Russia. Tim's extended presence in the Soviet Union to work on the experiments was a key factor in a collaboration that constituted a bright spot during the tense years of the cold war. Elements of that collaboration continue at Fermilab to this day.

During the 1970s and early 1980s, experiments at Fermilab and at its European counterpart, CERN, raised questions that could be answered only by creating particle collisions at energies far greater than existing accelerators could provide. In 1987, President Ronald Reagan endorsed an ambitious plan to build the Superconducting Supercollider (SSC), which would provide proton–proton collisions with an energy of 40 TeV,

compared to 2 TeV at Fermilab's Tevatron. In 1988, DOE officials selected a site encircling Waxahachie (near Dallas), Texas. Tim joined the new laboratory to participate in the detailed design and construction of the SSC, becoming deputy director of the conventional facilities division. Then, in 1993, following an expenditure of almost \$2 billion and after numerous scientists, engineers, and technicians had spent years of hard, successful work, Congress canceled the project, leaving those workers suddenly unemployed. Tim became an invaluable source of sympathy, counsel, and guidance for many of those who had committed their careers to bringing the SSC dream to fruition, only to see that dream suddenly vanish. The solace and the tangible assistance that Tim provided helped many of them through that traumatic experience.

Tim was extraordinarily skilled in planning the design and construction of accelerators and experimental facilities. But perhaps a still more important and, indeed, unique feature of Tim's presence on any project was his ability to relate to his colleagues and create the kind of morale and spirit that make the almost impossible seem within easy grasp.

Tim's interest and enjoyment in performing rites and services in his role as Roman Catholic priest brought joy to many and sympathy to others in time of need. Beyond the customary practice in that role, Tim could usually successfully press the appropriate authorities to waive rules too, so that he would, for example, be permitted to perform marriages not only in a church, but in a location that appealed to those people involved. Tim was available to his friends and colleagues—those of other faiths or those of no faith. All were of equal concern to Tim, if not in his formal, priestly role, then simply as a warm human being ready and able to lend his practiced ear, his sympathy, and his help. The story is told that after Tim had conducted a wedding of two friends—the groom, Roman Catholic, and the bride, Jewish—the father of the bride thanked him and told him he would make a wonderful rabbi.

Tim strongly believed that science and religion could, and should, coexist—that the one could draw strength from the other. The way he led his life was patterned after that conviction. Tim made each person who knew him feel special. Colleagues far and wide truly respected, trusted, and loved him. He was a wonderful companion in good times and bad. Those of us

who knew him will always be grateful for the gift of his friendship.

JAMES R. SANFORD

*Brookhaven National Laboratory
Upton, New York*

RICH ORR

Port Angeles, Washington

EDWIN L. GOLDWASSER

*University of Illinois
Urbana-Champaign*

Charles William Van Atta

Charles William Van Atta, an emeritus professor of engineering physics and oceanography at the University of California, San Diego (UCSD), died on 11 February 2001 of cardiac arrest while cross-country skiing on Mount San Jacinto in California.

Chuck was born on 24 February 1934 in New London, Connecticut. In his youth, he showed an interest in aeronautics, making hand-launched gliders and rubber-band-powered model airplanes. Chuck attended the University of Michigan in Ann Arbor, earning a BS in aeronautical engineering in 1958. He received his PhD in aeronautical engineering from Caltech in 1964. His dissertation research was directed by Donald Coles and concerned an experimental investigation of turbulence in the gap between rotating cylinders, a study that determined the research direction of his career.

Chuck worked briefly in the fluid physics section of NASA's Jet Propulsion Laboratory before joining the UCSD faculty, in 1965, as an assistant professor in the newly formed department of aeronautical and mechanical engineering sciences (AMES), with a joint appointment in the graduate department of the Scripps Institution of Oceanography. Chuck spent the remainder of his career at UCSD. He was promoted to associate and full professor in 1969 and 1975, respectively, and assumed emeritus status in 1994.

In addition to laboratory experiments, Chuck made field measurements in the atmospheric boundary layer over the ocean. In 1969, he spent two weeks on the Caribbean Sea, making velocity measurements from the Scripps Institution's floating instrument platform (FLIP) near Barbados as part of the BOMEX (Barbados Ocean Mixing Experiment) boundary layer meteorology experiment. In these varied research projects, Chuck trained 17 doctoral students from Asia, Europe, and the US. Several have gone on to distinguished careers in



CHARLES WILLIAM VAN ATTA

business, government, and academia.

Chuck's insightful laboratory experiments on structure functions and spectral energy transfer in isotropic turbulence are universally recognized as pioneering contributions to advances in the statistical theory of turbulence. He established a reputation for providing experimental data that could be trusted to stand the test of time. In 1983, with his graduate students and postdoctoral colleagues, he tackled fundamental issues concerning the effects of shear and stable stratification on turbulence. The results of these experiments have been used to interpret field measurements in the atmospheric boundary layer over the ocean and direct numerical simulations of the related systems.

A measure of the esteem Chuck was held in by his colleagues is the Mini-Symposium on Turbulence and Turbulent Mixing held in his honor at the 2001 American Physical Society's Fluid Dynamics Division Meeting in San Diego, California.

Chuck was an avid outdoorsman. His hobbies included backpacking, rock climbing, biking, skiing, snorkeling, and surfing. He and his wife, Ann, traveled widely and took lengthy hiking trips in Nepal during the 1980s. With six friends, Chuck climbed Mount Kilimanjaro in 1999. He was extremely proud of his two young grandsons born of his only child. His engaging and amiable personality and keen scientific mind will be sorely missed by the fluid mechanics community.

CARL H. GIBSON

PAUL A. LIBBY

SUTANU SARKAR

*University of California, San Diego
La Jolla ■*