he published some 20 papers and a book chapter on the subject. Again, he was an important sounding board, and his erudition and critical scientific taste played major roles in that effort. Ted continued to act as a wise sounding board for young theorists who joined the lab in the 1980s.

Ted spent the years 1990–92 as the technical assistant to the director of the physical science department at Yorktown and, during that period, served on two NSF panels on teacher enhancement. Improving elementary science education then became his abiding interest. He believed he needed to do something more.

After he retired from IBM in 1992, Ted moved to the nation's capital and became the program officer for networking at the National Science Resource Center, a position he held until 1996. He oversaw the production and writing of two sections for the study *Resource for Teaching Elementary School Science*, published by the National Academy Press in 1996. He then consulted for and subsequently became an employee of the American Physical Society. He worked for the society's Teacher–Scientist Alliance Institute, which implements systemwide reform of science education through intensive five-day institutes. Ted helped produce and lead those institutes. He retired from APS in 2001, at about the time he became ill.

A man of many interests, Ted was very active in the 1960s in Democratic politics in the village of Ossining, New York. He worked with Ossining's mayor, another theorist from IBM, and helped lead the village into an urban renewal program. Ted also became a leader of the local Friends of Music of Ossining. In no small measure, it is because of Ted's knowledge and good sense that the organization is healthy and still producing a six-concert chamber music series in a time when dwindling audiences have ended many such enterprises.

Much of Ted's life centered on his family—his wife of 47 years, Almut, and his two daughters. He was always proud of his daughters' accomplishments: Jennifer's work as a teacher of English as a second language abroad and in the US and Andrea's career as a professional violinist who is devoted to chamber music. Ted was overjoyed by the birth of his second grandchild shortly before he died. For his family, Ted designed and helped build a beautiful contemporary home overlooking the Hudson River. His house was featured in *Better Homes and Gardens* in 1969.

Ted loved classical music and played the cello and the piano. He enjoyed bridge, tennis, sailing, photography, camping, and cross-country skiing.

Ted's intellectual curiosity was insatiable and his knowledge was vast. He believed in the rational pursuit of truth and lived passionately according to his ideals. He cared deeply about other people, and his love for others was reciprocated. He is missed very much by his family, colleagues, and many friends.

Alan B. Fowler
IBM T. J. Watson Research Center
Yorktown Heights, New York

Julia A. Thompson

Julia A. Thompson, who made contributions to many important subfields in experimental particle physics, particularly in the area of weak interactions, died in an automobile accident on 16 August 2004 in Wood River, Illinois. During her career, Julia participated in experiments at several particle accelerator laboratories, including Brookhaven National Laboratory, CERN, and Russia's Budker Institute of Nuclear Physics in Novosibirsk. She had been working on the MINOS experiment at Fermilab at the time of her death.

Born on 13 March 1943, in Little Rock, Arkansas, Julia graduated from Cornell College in Mt. Vernon, Iowa, in 1964 with a BA in physics. She earned her MS from Yale University in 1966. Three years later, she received her PhD from Yale in the field of elementary particle physics under the joint supervision of J. Sandweiss and one of us (Willis), with a thesis entitled "An Isospin Conservation Test from K-p Interactions at 400 MeV/*c*."

In 1972 Julia joined the faculty of the department of physics and astronomy at the University of Pittsburgh. She was affiliated with the university for the remainder of her career. She was a dedicated teacher of undergraduate students and a strong proponent of involving them in her research activities. During her career, she supervised some 60 undergraduate student researchers, some of whom became coauthors on her publications. In 1992 she founded Research Experiences for Undergraduates in Physics—Focus on Minorities, a program that placed undergraduate students in research groups during the summer months. Funding from NSF and the support of her university and department—which provided her with released time from teaching—along with enthusiastic participation of her university colleagues, made the program a success.

In 1988 Julia decided to join the CMD2 project, a new experiment at the low-energy e^+e^- collider VEPP-2M at Novosibirsk. She recognized at once the potential to study charge conjugation–parity violation (*CP*) in the kaon system and spent a sabbatical year, 1989–90, developing her ideas. She made plans for a comprehensive study of phi decays to kaon pairs, including a realistic estimate of possible systematic effects.

It was rare at that time for Western physicists to work for extended periods in Novosibirsk, particularly during the winter months, and to do so was logistically and ideologically complicated. As the era of the Soviet Union was drawing to a close, there were shortages of food and essential items; Julia, along with her Russian colleagues, endured those shortages during an unusually cold winter. Such difficulties did not discourage her from becoming a regular visitor to Novosibirsk. Her final doctoral student carried out a study of tagged decays of charged kaons in the CMD2 experiment, which permitted Julia to see her original ideas come to fruition. She spoke fluent Russian, which she often used for presentations at seminars in Novosibirsk, and always traveled with a book of Russian poetry.

Julia A. Thompson (center)

In 1999 during a visit to South Africa, Julia took the initiative to contact the education ministry in Cape Town and visit several high schools to learn about their physics programs. (The photograph above shows Julia speaking to high-school students at a career fair near Cape Town in 2002.) She spoke to a number of local physicists interested in outreach to high schools; after the end of apartheid,

high schools had greatly expanded in scope. Her efforts subsequently led to NSF-supported programs at several US universities to send teams of physicists, teachers, and undergraduates to high schools in South Africa to help initiate programs that would enhance hands-on physics training. The programs are now sustained through the efforts of local education ministries and scientists.

In 2000–02 Julia established and directed a Research Experiences for Undergraduates program at Southern Illinois University in Edwardsville as a satellite of the Pittsburgh program. In 2002 she initiated QuarkNet activities, partly through her research program at the University of Pittsburgh and partly through a cosmic-ray program based at the University of Missouri–St. Louis. Specifically, as part of this nationwide outreach program, Julia worked with high-school teachers and students in the St. Louis area to build cosmic-ray detectors that would be placed in high schools and to organize the data collection so that the data obtained from different sites could be combined. She was appointed adjunct professor of physics at Missouri in 2003.

Julia was active in the American Physical Society, where she served on a number of committees that addressed issues concerning the participation of both women and minorities in physics. She took a special interest in African American students in her own programs and was in regular contact with the National Society of Black Physicists. She frequently gave talks on both her physics research and outreach activities at the NSBP's annual meetings.

Julia was a dedicated scientist and teacher whose work was interrupted at the height of her career. She is missed by a large number of students, colleagues, and collaborators from around the world. She is remembered as a tireless and tenacious physicist, a compassionate and caring individual, and, above all, a champion for the underprivileged.

Keith Baker
Hampton University
Hampton, Virginia
Wilfred E. Cleland
University of Pittsburgh
Pittsburgh, Pennsylvania
Simon Eidelman
Budker Institute of Nuclear Physics
Novosibirsk, Russia
William J. Willis
Columbia University
New York City

Ming Xie

Ming Xie, a world-renowned theorist in free-electron lasers (FELs), died in Wuhan in his homeland of China on 23 August 2004 after a year-long battle with cancer.

Born in Beijing on 10 May 1959, Ming obtained his BS in physics from Wuhan University in 1982. For his graduate education, he came to the US as one of the early participants in the China–US Physics Examination and Application Program. He obtained his MS (1984) and PhD (1989), both in physics, from Stanford University. His doctoral thesis work on the theory of optical guiding in FELs was supervised by John Madey.

After receiving his PhD, Ming went to Lawrence Berkeley National Laboratory (LBNL) as a postdoc in the center for beam physics, where he worked primarily with one of us (Kim). Shortly thereafter, he was named a permanent staff scientist, a position he held until his death. He became a guest professor at Beijing University in 1998.

Beginning with his dissertation work, Ming pursued a lifelong interest in the theory of FELs, to which he made important contributions that brought him wide recognition. One of the early topics Ming studied at Berkeley was the performance and optimization of hole-coupled resonators in an FEL oscillator. He developed an accurate computational method for the hole-coupling efficiency, which became the basis of a highly stable, high-power IR FEL design proposed for the Chemical Dynamics Research Facility at LBNL—but the research facility was never built. The depth to which Ming pursued that research and the thoroughness of his investigations became the hallmarks of his subsequent work.

Armed with the numerical techniques he developed for optical resonator modes, Ming then attacked and eventually succeeded in solving the formidable integro-differential equation for high-gain FELs, including the effects of imperfect electron-beam quality. Again with his characteristic thoroughness, Ming developed a many-parameter fitting formula for high-gain FEL performance based on numerical evaluation of his exact solution and benchmarking to simulation code results. The fitting formula has been in wide use in the global FEL community as a numerical tool for rapid parameter optimization. That work and other investigations made Ming a significant early contributor to the physics and design of so-called fourth-generation light sources such as the Linac Coherent Light Source x-ray laser project at SLAC.

Ming Xie

Ming's FEL work led him naturally to contribute to other areas such as laser acceleration theory and its connection with electromagnetic radiation; gamma–gamma interactions; physics of the interaction point of future high-energy colliders; and charged-particle cooling for future muon colliders. Despite the brevity of his career, he wrote or coauthored some 70 papers in refereed journals and conference proceedings, and contributed to the design reports for three new accelerators.

In recognition of his work, Ming was chosen to take on major tasks at important meetings. He was either a co-organizer or session chairman of the International Free-Electron Laser Conference from 1996 until his death.

Ming's interactions with his colleagues were friendly and sometimes intense, but were guided by his independent thinking, deep technical knowledge, and scientific integrity. One was often struck by the innocence of his questions at seminars and by his tenacious pursuit of scientific truth, which occasionally led to unintended confrontations with colleagues near and far. Although he became a US citizen, Ming remained proud of China's success in evolving into an industrial and scientifically powerful country. His early death is a loss to all of us in the community.

William Fawley
Miguel Furman
Lawrence Berkeley National Laboratory
Berkeley, California
Kwang-Je Kim
Argonne National Laboratory
Argonne, Illinois ■