

Peter Eisenberger joined Columbia University in September as vice-provost for the Earth Institute at Columbia University in New York City and director of the Lamont-Doherty Earth Observatory in Palisades, New York. Before then, Eisenberger had been director of the Princeton Materials Institute at Princeton University.

At the 18th International Free-Electron Laser Conference in Rome in August, **Charles A. Brau** was honored with the FEL Prize for 1996. Until last year, Brau, a professor of physics at Vanderbilt University, had directed Vanderbilt's FEL development program.

At the 19th International Congress of Radiology in Beijing in June, the In-

ternational Society of Radiology presented its Bèlère Medals to **Maurice Tubiana** of Paris, France, a past president of ISR; **Philip Palmer** of Davis, California, a former chairman of the International Committee on Radiologic Education; and **Gerald Hanson** of Washington, DC, who recently retired as chief of the Radiation Medicine Section of the World Health Organization.

The new director of the Institute for Systems Research at the University of Maryland, College Park, is **Gary W. Rubloff**. Rubloff had been associate director of the National Science Foundation's Engineering Research Center for Advanced Electronic Materials Processing and a professor of electrical and computer engineering at North Carolina State University.

about, and instruments for the investigation of, the natural phenomena with which the practitioners are concerned. The resulting amalgam of theory and experiment—which Kuhn initially termed a paradigm—could not, he insisted, be altered bit by bit over time. Instead, science develops thereafter through the wholesale replacement of one paradigm by a successor, occasionally budding new disciplines in the process.

Kuhn's *Structure* did not thoroughly develop every element of this scheme. The concept of a paradigm was not entirely well defined; nor did Kuhn fully lay out the conditions that would transform an anomaly into a crisis. Perhaps most challenging of all to *Structure's* readers was Kuhn's concept of incommensurability between paradigms, a notion that undergirds his entire theory. According to this concept, competing paradigms cannot be compared piecemeal with one another because their respective sets of objects, and relations between objects, are certain to be entirely different from one another. In the years after the publication of *Structure*, Kuhn attempted to refine and to clarify his system, and especially this fundamental aspect of it, often in response to criticism from philosophers of science.

Kuhn's most detailed study of a particular scientific development, his *Black-Body Theory and the Quantum Discontinuity, 1894–1912*, appeared in 1978 (Oxford University Press). Here, he provided an account of Max Planck's route to his new theory of black-body radiation, an account that strikingly exemplifies Kuhn's understanding of science. Although he did not use the language of paradigm, normal science, anomaly and crisis, Kuhn's argument in *Black-Body Theory* depended quite directly on these notions. In his study, Kuhn argued that Planck had initially conceived his innovations to lie entirely within the purview of what was later termed classical physics. Like most of his work, Kuhn's arguments in *Black-Body Theory* engendered a great deal of discussion, and they were not fully accepted by all historians of physics. Nevertheless, this book stands as his most detailed attempt to carry through for one episode what Kuhn claimed held true for all of science.

During the last two decades of his life, Kuhn sought to develop in a rigorous manner the central concept of incommensurability, or what he later referred to as untranslatability. In his last publications, he accordingly developed for science a taxonomy for categories of objects (such as kinds of optical waves or kinds of force) that was built upon the principle that proper

OBITUARIES

Thomas S. Kuhn

Thomas S. Kuhn, a widely influential historian and philosopher of science, died of cancer on 17 June 1996 at his home in Cambridge, Massachusetts. Born in Cincinnati on 18 July 1922, Kuhn trained in physics at Harvard University, where he received an SB in 1943, an AM in 1946 and a PhD in 1949. He published three papers in physics and mathematics before his interests turned decisively in the early 1950s to the history, and eventually to the philosophy, of science. Over the next 40 years, he wrote four books and many articles in these areas and taught the history of science at Harvard (1951–56), the University of California at Berkeley (1956–64), Princeton University (1964–68) and finally MIT (starting in 1979). At MIT, Kuhn retired as Laurence S. Rockefeller Professor of Philosophy in 1991 and became an emeritus professor.

Kuhn is best known for his 1962 monograph, *The Structure of Scientific Revolutions* (University of Chicago Press), which has appeared in many editions and translations. In *Structure*, Kuhn argued that the development of science cannot be understood simply as a process in which more accurate conceptions gradually replace less accurate ones under the impetus of experiment. Though he certainly did think that the body of scientific knowledge becomes increasingly coherent and powerful over time, Kuhn insisted that scientific theories, and the instruments and experiments associated with them, should be understood



THOMAS S. KUHN

as tightly integrated wholes that do not easily, or perhaps ever, change bit by bit. Nor, he further argued, is it historically fruitful to estimate the power of one scientific scheme in comparison with that of its successor or predecessor.

In the earliest stages of scientific development, Kuhn argued, individuals usually disagree fundamentally with one another over the most elementary aspects of their subject, including the standards according to which success itself is to be evaluated. Eventually the community of practitioners reaches agreement on fundamental matters, perhaps even constituting thereby a new discipline; this process takes place in conjunction with the production of a coherent theory

categories must be nested among one another. This requirement, which forbids partial overlap between categories, permitted Kuhn to recast his original concept of incommensurability in a more rigorous form because, with this new understanding, scientific systems could be commensurate with one another—or, in the term he preferred, mutually translatable—only if they shared the same taxonomic structure. Unfortunately, death interceded before Kuhn was able to finish a manuscript fully laying out his developed understanding, although his last publications go quite far in doing so, and an edited version of his final writings will eventually appear in print.

Kuhn was deeply committed to his work, and anyone who wanted to benefit from his tutelage had to be as serious about it as Kuhn himself was. Many of his students gained a great deal indeed from his close scrutiny of their work and his powerful, dedicated drive to uncover the essential meaning of past scientific conceptions. He brought the same intensity to his personal life that he brought to the history and philosophy of science. His friends and his students, including myself, will long remember Tom's dedication to the truth of the matter, as he saw it, in both life and work.

JED Z. BUCHWALD

Massachusetts Institute of Technology

Katharine Way

Katharine Way, a pioneer in developing techniques for the retrieval, evaluation and dissemination of information on nuclear structure, passed away in Chapel Hill, North Carolina, on 8 December 1995.

Born in Sewickley, Pennsylvania, on 20 February 1903, Kay Way earned a BS in physics from Columbia University in 1932 and a PhD in nuclear theory from the University of North Carolina in 1938 under John Wheeler. After a year teaching at Bryn Mawr College, she became an instructor and assistant professor at the University of Tennessee. In 1942, she started doing wartime work, briefly in Washington, DC, and then at the Metallurgical Laboratory in Chicago, where she worked on reactor design, evaluation of reactor constants and the organization of radioactivity data on fission products. Theoretical work there with Eugene Wigner led to what became known as the Way-Wigner formula for fission-product decay. She also began to systematize the vast quantities of new results produced by wartime research, at first as a much-enjoyed



KATHARINE WAY

hobby and eventually as the work that absorbed a major fraction of her time and effort for the remainder of her professional career.

In 1945, Kay joined the Clinton Laboratories in Oak Ridge, Tennessee, the forerunner of Oak Ridge National Laboratory (ORNL). She continued her analysis of fission products and began collecting and organizing the growing amount of data on nuclear decay. There also, Kay provided the seminal idea for what has become Oak Ridge Associated Universities.

In 1947, Kay moved to the National Bureau of Standards in Washington, DC, where she devoted herself full-time to the data evaluation needs of the basic and applied research communities. She coauthored a series of publications that evolved into the Nuclear Data Sheets, and created the Nuclear Data Project in 1953. The project moved to ORNL in 1964, and Kay continued as its head until her retirement in 1968.

In 1964, Kay arranged with Academic Press to establish a new journal, *Nuclear Data Sheets*, to publish the extensive data that she and her colleagues had prepared, and in 1965 she was instrumental in establishing a second journal, now titled *Atomic Data and Nuclear Data Tables*. During this same period, Kay persuaded the editors of *Nuclear Physics* to add keywords to the title page of each article, a practice that has evolved into the Nuclear Science Reference File. After retiring from ORNL in 1968, Kay relocated to the Triangle Universities Nuclear Laboratory in Durham, North Carolina, and became an adjunct professor at Duke University.

By her insistence on the critical evaluation of all published basic data and her ability to combine these data

into as logical and self-consistent a set of nuclear structure properties as possible, Kay influenced an entire generation of evaluation experts and the presentation of data in physics literature.

Kay Way felt and expressed herself passionately not only about the analysis of nuclear data, but also about many issues of human fairness and social justice. In such matters, she was an outspoken advocate rather than merely a sympathetic bystander. In Washington, Oak Ridge and Durham, she surrounded herself with many colleagues. They all remember with affection and gratitude her keen intelligence, sharp wit and loyal decency.

MURRAY MARTIN

NORWOOD GOVE

RUTH GOVE

SUBRAMANIAN RAMAN

Oak Ridge, Tennessee

EUGEN MERZBACHER

Chapel Hill, North Carolina

Brian Edward Bent

Brian Edward Bent, a professor of chemistry at Columbia University and an experimental surface scientist of exceptional distinction and promise, collapsed and died on 23 July 1996 while on vacation with his family in northern Minnesota. He was 35 years old.

Brian was born in Minneapolis. He earned a BA in chemistry from Carleton College in 1982 and a PhD in physical chemistry from the University of California, Berkeley, under Gabor Somorjai, in 1986. He joined the Columbia faculty in 1988 after two years of postdoctoral research with Ralph Nuzzo at AT&T Bell Laboratories.

Brian's elegant studies of the molecular details of chemical reactions on solid surfaces answered long-standing questions in materials deposition and etching, metal-catalyzed organic synthesis, and heterogeneous catalysis. He showed that ultrahigh-vacuum spectroscopic studies of stable monolayers adsorbed on cold single-crystal surfaces can in fact give kinetic and mechanistic information about technologically important high-pressure, high-temperature surface reactions. One such reaction is the Fischer-Tropsch process for making hydrocarbons by metal-catalyzed hydrogenation of carbon monoxide. This reaction affected history: Without fully understanding the chemistry of the process, the Germans used it to make 15 million barrels of fuel a year during World War II. Brian determined the mechanism of the Fischer-Tropsch process—a mechanism that had been debated for over 60 years—by demonstrating and studying the methylene-methyl mi-