Masahiro Wakatani FREE

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Satoshi Hamaguchi; Akira Hasegawa; James W. Van Dam

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president of the American Geological Institute from 1964 to 1965; he received its Ian Campbell Medal in 1984 and its Legendary Geoscientist Award in 2000. In 1961, the Geological Society of America gave him its Arthur L. Day Medal; he was president of the society from 1967 to 1968. Konnie was president of the Geochemical Society from 1970 to 1971 and received its V. M. Goldschmidt Award in 1982. Those medals and awards are the highest honors given by the three professional societies. He was also honored with the Mineralogical Society of America's Distinguished Public Service Medal in 1994.

Geochemistry has come a long way, thanks to intellectual leaders such as Konnie. Perhaps no other geochemist so expertly and faithfully served the Earth science profession in such far-ranging ways. Konnie was enormously effective in all of them—as geologist, geochemist, and science and technology adviser to the nation. He was a scientific icon. His insightful scientific contributions and keen wit are greatly missed.

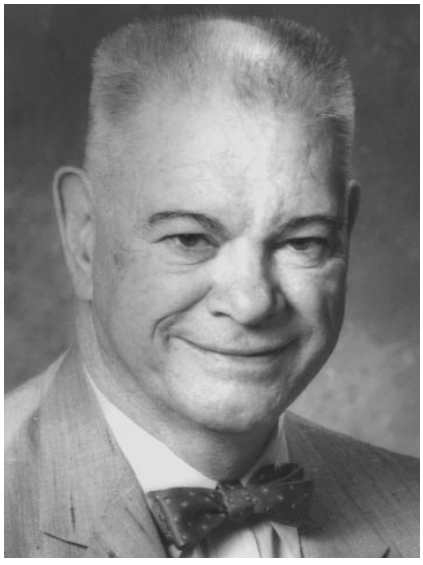
W. Gary Ernst
Stanford University
Stanford, California

William George McMillan Jr

William George McMillan Jr, an emeritus professor of physical chemistry at UCLA, died of a heart attack on 23 November 2002 in Los Angeles, California. Throughout his career, he combined teaching and research with extensive service as a consultant to the US military.

A native Californian, Bill was born on 19 October 1919 in Montebello and graduated from Montebello High School, where he was greatly influenced by his chemistry teacher, Leon Broock. Bill received his BA in chemistry from UCLA in 1941 and two degrees from Columbia University: an MS in chemistry in 1943 and a PhD in chemical physics in 1945. His dissertation research in statistical mechanics with Joseph E. Mayer concerned the theory of solutions. The results, now known as the McMillan–Mayer theory, are still widely cited. From 1944 to 1946, still at Columbia, Bill was a research chemist on the Manhattan Project and worked on the separation of uranium-235.

On receiving a Guggenheim fellowship in 1946, Bill, with Edward Teller, carried out research in nuclear physics at the University of Chicago. He became an assistant professor of chemistry at UCLA the following year, and by 1959 had risen to the rank of full professor. As chair from 1959 to 1965, Bill led the department of chemistry through a period of rapid growth and development of its research and teaching programs and established a strong infrastructure. His leadership was instrumental in bringing the department to national attention.



William George McMillan Jr

Bill felt a strong commitment to government service. Unlike many in academe (whom he frequently criticized as parochial), he thought the country was continually in mortal danger from the Soviet Union. He worked part-time from 1954 to 1971 for the RAND Corp in Santa Monica, California, as a consultant to the US military. At UCLA, he established defense science seminars (1964–66) to help revitalize the contact between young scientists in the universities and those in government service and in the defense community. While on leave from the university, Bill served from 1966 to 1968 in Vietnam as science adviser to General William Westmoreland. There, Bill developed concepts for artillery and military reconnaissance. After contracting hepatitis in Vietnam, he researched the disease and developed a physicochemical description of it.

Although much of Bill's time was spent in government service that gave rise to many specialized reports—some still classified—his academic publications dealt with a wide variety of topics. They ranged from early work on multicomponent systems to later statistical mechanical and quantum mechanical studies on the Thomas–Fermi model of the atom, transitions in two-dimensional adsorbed layers, dispersion forces between molecules, a comprehensive review of the virial theorem, and applications to ions in solution.

In 1971, Bill founded McMillan Science Associates, which he built up over subsequent decades as a wide-ranging consulting company for high-technology and military projects. He was interested in topics as diverse as traffic flow, global warming, ozone depletion, and atmospheric studies of Venus. A part-time faculty member at UCLA in his later years, he continued his many activities after retiring from the university in 1990.

Over several decades, Bill served on numerous advisory boards and committees dealing with national security. Among his many citations and awards are the US Army's Distinguished Civilian Service Award (1968), Knight of the National Order of Viet Nam (1969), and the US Air Force's Exceptional Civilian Service Award (1984).

Bill was an enthusiastic and well-organized teacher in courses ranging from first-year chemistry to graduate courses in quantum chemistry and statistical mechanics. He would astonish students in a computer age with quick back-of-the-envelope calculations. He had a brilliant mind and could talk and write about anything from planetary physics to the thermodynamics of solutions.

Robert L. Scott
Charles M. Knobler
University of California
Los Angeles

Masahiro Wakatani

On 9 January 2003, Japan lost one of its most prominent theoretical plasma physicists when Masahiro Wakatani died unexpectedly from a cerebral hemorrhage at his home in Nara, Japan.

Wakatani was born on 15 May 1945 in Osaka, Japan. He graduated from Kyoto University in 1968 with a BSc in nuclear engineering and received a doctor of engineering degree in electrical engineering from the same university in 1973. His doctoral research, under Ryohei Itatani, was on the magnetohydrodynamic (MHD) equilibrium and stability of a toroidal pinch. In his thesis, he calculated the collision diffusion coefficients for that device, using the now-famous neoclassical transport theory that had just been developed by Roald Sagdeev and Alec Galeev. Their theory indicated

that trapped particles significantly increase diffusivity in toroidal confinement devices.

Following the completion of his thesis, Wakatani joined the Japan Atomic Energy Research Institute, in Naka, as a member of the thermonuclear research division. In 1976, he moved to the Institute of Plasma Physics at Nagoya University. At both places, he continued to work on MHD stability and neoclassical transport, although his interest had shifted toward the tokamak, whose confinement by then had outperformed that of other fusion devices.

Wakatani joined the faculty of Kyoto University's Plasma Physics Laboratory in 1978 as an associate professor. As leader of a theory group, he began collaborating with experimentalists who worked on the Heliotron, a plasma confinement device with a helical magnetic field characterized by high shear. That same year, he published the reduced MHD equations for helical systems—a simplified version of the full MHD equations that still retained the essential physics for a helical plasma confinement device and also were amenable to nonlinear numerical simulations using the computational power available at that time. Wakatani's reduced MHD equations, later generalized by Henry Strauss for helical systems with high plasma pressure, turned out to be extremely useful for analyzing the complex MHD properties of those devices. The equations are still the popular, basic model for helical systems.

In the early 1980s, Wakatani began to study anomalous transport due to turbulence arising from microinstabilities, a major obstacle to improved plasma confinement. In 1983, Wakatani and one of us (Hasegawa) derived a set of nonlinear evolution equations (now known as the Hasegawa–Wakatani equations) that describe strong turbulence caused by the resistive drift-wave instability at the edge of a plasma. With these equations, we showed that an inverse cascade of energy from short to long wavelengths occurs in turbulence. We also found a prototype mechanism for generating large-scale poloidal flow structures, for instance, zonal flows and streamers in a tokamak; such structures are currently the subject of extensive investigation.

Masahiro Wakatani

Wakatani was appointed to a full professorship in the Plasma Physics Laboratory in 1985. Ten years later, because of a major reorganization within Kyoto University, he became a professor in the newly established Graduate School of Energy Science and in the department of nuclear engineering.

In addition to his scientific accomplishments, Wakatani was a talented administrator at Kyoto University and in the international fusion community. At the time of his death, he was a key member of the University Council; he provided valuable direction in preparation for the imminent reorganization of the entire national university system in Japan. He played a leading role in the worldwide program to design ITER, an international thermonuclear experimental reactor. From 1980 to the time of his death, he was a steering-committee member of the Joint Institute for Fusion Theory (JIFT), which coordinated US–Japan collaboration activities. He headed up the Japanese delegation to the first JIFT workshop and organized more workshops in Japan. He was the JIFT visiting professor to the US in 1988.

Wakatani was a dedicated teacher who supervised dozens of thesis students. Graduates of the "Wakatani school" now populate theory groups around Japan. Despite his busy schedule, he found time to write four fine plasma physics textbooks. He was devoted to his family and especially enjoyed listening to his wife and three daughters perform classical chamber music.

As a scientist, collaborator, administrator, teacher, and friend, Wakatani was a gentleman—courteous, dignified, calm, and considerate. He looked for praiseworthy characteristics in people. Even during heated discussions, he was willing to listen, be fair, and provide information. When asked for help, he did not say no, and he would commit himself to even those tasks that were an imposition on his work schedule. His creativity, integrity, and leadership were deeply respected by the international scientific community.

Satoshi Hamaguchi
Kyoto University
Kyoto, Japan
Akira Hasegawa
Kyoto, Japan
James W. Van Dam
University of Texas at Austin ■