science book ever published in the English language. His articles appear regularly in *Parade* magazine.

Sagan received his PhD in astronomy and physics from the University of Chicago in 1960. From 1962 to 1968 he was a lecturer and then assistant professor of astronomy at Harvard University. Since 1968 he has been on the faculty at Cornell, where he is now the David Duncan Professor of Astronomy and Space Sciences and director of the Laboratory for Planetary Studies.

The topic of Chu's Richtmyer Memorial Lecture was laser-cooled atoms. Chu described several techniques used for optical cooling and trapping of atoms and molecules and discussed how they could be applied to answer some questions in basic physics and biology.

Chu received his PhD in physics from the University of California, Berkeley, in 1976. From 1983 to 1987 he was head of the quantum electronics research department at AT&T Bell Laboratories. He has been a professor of physics and applied physics at Stanford University since 1987.

At the January meeting AAPT also presented distinguished service citations to John L. Hubisz Jr, a physics professor at the College of the Mainland in Texas City, Texas; Karen L. Johnston, an associate professor of physics at North Carolina State University; Philip C. Peters, a physics professor at the University of Washington; Roger H. Stuewer, a professor of physics and astronomy and director of the history of science and technology program at the University of Minnesota; and Howard G. Voss, a physics professor at Arizona State University.

Also at the January meeting, APS presented the 1989 Apker Award, which recognizes undergraduates who have excelled in both academics and physics research, to Deborah Kuchnir, who was an undergraduate at MIT, and to Steven H. Simon, who was an undergraduate at Brown University (see PHYSICS TODAY, December, page 85). Steven Gubser, the 1989 International Physics Olympiad Gold Medal winner (see PHYSICS TODAY, October, page 115), received a special award from APS.

At the June 1989 meeting of the American Association of Physics Teachers, Peter Lindenfeld of Rutgers University received the Robert A. Millikan Lecture Award, which recognizes "notable and creative contributions to the teaching of physics." The award citation called him "that rare combination of distinguished researcher and inspiring teacher." Much of Lindenfeld's effort has been aimed toward strengthening ties between research physicists and physics teachers, including preparing experiments and materials for summer institutes for high school teachers. He currently heads the executive committee of the Center for Mathematics, Science and Computer Education at Rutgers. Lindenfeld's research is in superconductivity and other properties of metals.

Lindenfeld's Millikan lecture was entitled "The Einsteinization of Physics." In it he deplored the popular image in which physics—as symbolized by Einstein—is perceived as largely incomprehensible, and urged that physics teaching become less abstract.

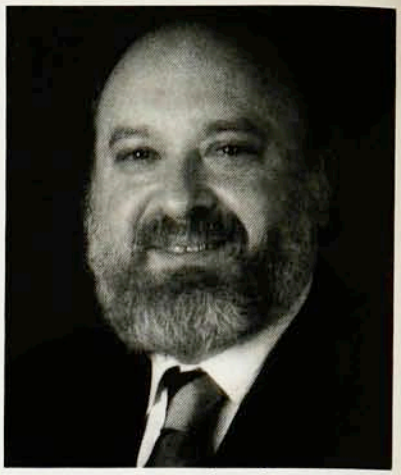
Lindenfeld received his PhD in physics from Columbia University in 1954. He then joined the department of physics and astronomy at Rutgers, where he became a professor in 1966.

## IUPAP COMMISSION MARKS KADANOFF'S CONTRIBUTIONS

The statistical physics commission of the International Union of Pure and Applied Physics has named Leo Kadanoff winner of the Boltzmann Medal. The medal was presented by the chairman of the commission, J. M. J. van Leeuwen, at the commission's Statphys conference held last July in Rio de Janeiro, Brazil.

Kadanoff is best known for introducing the idea of scaling into the theory of critical phenomena and phase transitions. In a paper published in 1966, he pointed out the association between the properties of critical correlations and the thermodynamic singularities at the critical point. In a follow-up article, he led a large collaboration in demonstrating the consequences of scaling. The group showed that the details of the interactions among the individual molecular units are irrelevant because of scale-invariance. From this work emerged the experimentally supported hypothesis that the behavior of a system very near its critical point depends only on its dimensionality and on the dimensionality in which the system's spins are free to move and not on local interactions between particles, the "universality hypothesis."

Other topics that have attracted Kadanoff's attention are correlation functions in quantum statistical mechanics, superfluid helium and theoretical models of quarks and strings.



**Leo Kadanoff**

His current research interests are chaos, multifractality and turbulence.

Kadanoff received his PhD in physics from Harvard University in 1960. From 1961 to 1969 he was on the faculty of the physics department at the University of Illinois at Urbana-Champaign. From there Kadanoff moved to Brown University, where he was a professor of engineering and physics. Since 1978 he has been a John D. and Catherine T. MacArthur Distinguished Service Professor of Physics and Mathematics at the University of Chicago.

## IN BRIEF

As of September, Sigma Xi has a new executive director, **John F. Ahearne,** formerly vice president and senior fellow of Resources for the Future in Washington, DC. Ahearne is overseeing the relocation of Sigma Xi headquarters from New Haven, Connecticut, to Research Triangle Park in North Carolina, and will direct the organization's major expansion of activities planned for the next decade.

**Haim Harari,** the Annenberg Professor of High-Energy Physics at the Weizmann Institute of Science in Rehovot, Israel, has become president of the institute. Harari has been at the Weizmann Institute since 1966.

**David Neufeld,** most recently a visiting postdoctoral researcher in astronomy at the University of California, Berkeley, has become an assistant professor at The Johns Hopkins University, in the department of physics and astronomy.

Last year **Gerald Dugan** became head of the accelerator division at the Fermi National Accelerator Laboratory. He replaced **Helen Edwards,** who left Fermilab to head the accelerator division of the Superconduct-

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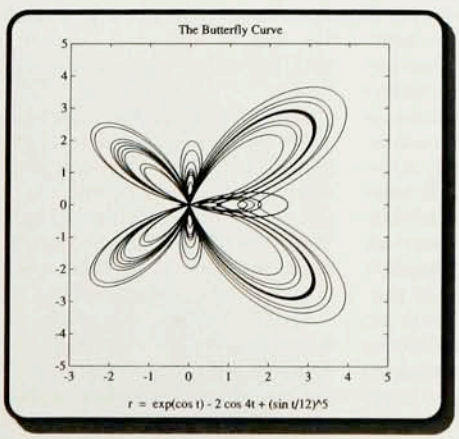


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ing Super Collider Laboratory in Dallas, Texas. Dugan was previously head of Fermilab's antiproton source department.

**Simon Foner,** chief scientist at the MIT Francis Bitter National Magnet Laboratory, is now also associate director of the laboratory.

# OBITUARIES

## George Pimentel

Until his death on 18 June 1989, George Pimentel devoted his unbounded energy and passion to science, to his students and colleagues, to his family, and to an occasional ballgame.

George was born 2 May 1922 in California's Central Valley. He grew up in a poor section of Los Angeles, attended public schools and earned a bachelor's degree in chemistry from the University of California, Los Angeles, in 1943. Following a short stint at Berkeley working on the Manhattan Project, George trained for submarine duty in the Navy. At the close of the war he participated in the formation of the Office of Naval Research and in early consideration of nuclear-powered ships.

In 1946 George returned to Berkeley to do graduate work with Kenneth Pitzer on infrared spectroscopy. Three years later he had earned his PhD in chemistry and joined the faculty. During his career George developed methods of vibrational spectroscopy to study molecular bonding and chemical reactivity, to produce the first chemical lasers and to explore the planet Mars.

George attacked the important problems. During the 1950s he developed the matrix-isolation technique to trap free radicals, extremely reactive molecules that play a central role in chemical reactions. A solid matrix of inert gas molecules, cooled to the temperature of liquid hydrogen, prevented a free radical embedded inside it from reacting, thus allowing leisurely spectroscopic study of the radical. This method was used first to investigate the HCO radical and to record spectra of hydrogen-bonded species, and later to study rare gas compounds and many other interesting species. It is now employed routinely in most chemical laboratories. With Aubrey McClellan, George wrote *The Hydrogen Bond* (1960), the book on hydrogen bonding that guided the field for many years.

In the mid-sixties George's studies of fast reactions unlocked the secret to converting chemical energy directly into laser light. He and Jerry Kasper first discovered the iodine-atom photodissociation laser—$CF_3I + h\nu \rightarrow CF_3 + I(^2P_{1/2})$—which lased on the $^2P_{1/2} \rightarrow {}^2P_{3/2}$ transition, and then the $H_2 + Cl_2$ laser. After that, he and Karl Kompa developed the very practical HF chemical laser. This laser has since taught us much about chemical reactions and about the transfer of energy among molecules. It has also been developed into large and powerful laser systems.

George wanted to know whether there was life on Mars, and so he persuaded NASA to put one of his rapid-scan infrared spectrometers on a Mariner spacecraft to determine the chemical constituents of the Martian surface. His instrument was novel and clever, built from scratch on the Berkeley campus to NASA space flight standards. No evidence for biological material was observed, but much was learned about the planet's surface and atmosphere. George was chosen as a member of the first group of scientist-astronauts, but he withdrew when he learned that he would probably never get into space.

George was a national leader in science and science policy. He served as deputy director of the National Science Foundation from 1977 to 1980 and as president of the American Chemical Society in 1986. He organized and edited the National Academy of Sciences report *Opportunities in Chemistry*—often called the "Pimentel Report"—which was published in 1985 and later revised and released for use in high schools under the title *Opportunities in Chemistry: Today and Tomorrow*. In George's final lecture, the Priestley Medal Address given last April, he urged members of the scientific community to mount "a massive and ongoing campaign of public education," so that our society can sensibly weigh the risks and benefits of science and technology.

George loved to teach. He brought the significance of chemistry and the excitement of research to Berkeley freshmen, to his research students and collaborators, to national leaders and, through the CHEM study program, to secondary school teachers and students. He helped each of his research students attain a level of achievement well beyond reasonable expectations. Whether he was in the halls of Congress, in the classroom or eating a peanut butter sandwich, George's clear logic, his openness and candor and his concern for others always won his audience.

George Pimentel did everything with tremendous vigor, intensity, commitment and, above all, desire to succeed. Squash partners and opposing softball teams quickly found this out. George's idea of relaxation was winning a ballgame, mixing concrete or having a hundred friends over for a party.

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**George Pimentel**

George Pimentel chose his own epitaph:

"He went to the ballpark every day/And he let them know he came to play."

C. BRADLEY MOORE
*University of California, Berkeley*

## Michael J. Moravcsik

Michael J. Moravcsik died quite unexpectedly on 25 April 1989 in Turin, Italy. He was spending a term at the University of Turin, on leave from the University of Oregon.

Mike was a very active researcher in theoretical high- and intermediate-energy physics as well as in science policy, international scientific development and the "science of science." He was a dedicated teacher and a prolific writer on a broad range of topics.

Born in Budapest, Hungary, in 1928, Mike emigrated to the United States in 1948. He continued his education in physics and mathematics, receiving his AB from Harvard in 1951 and his PhD in theoretical physics from Cornell in 1956 under the supervision of Hans Bethe.

In 1958, after two years as a research associate at Brookhaven National Laboratory, he joined the theoretical physics division of the Lawrence Radiation Laboratory of the University of California, where he became head of the elementary-particle and nuclear physics group. In