

gies, in Murray Hill, New Jersey.

In July, **Chang C. Tsuei**, a scientist at IBM's T. J. Watson Research Center in Yorktown Heights, New York, was elected to Academia Sinica, the national science academy of Taiwan.

Gary W. Rubloff is the new director of the Institute for Systems Research at the University of Maryland at College Park. He has moved to Maryland from North Carolina State University in Raleigh, where he was associate director of the National Science Foundation Engineering Research Center for Advanced Electronic Materials Processing, and professor of electrical and computer engineering.

OBITUARIES

Shih-tung Tsai

Shih-tung Tsai, a longtime professor of plasma physics at the Institute of Physics in Beijing, died in Beijing from liver cancer on 20 June 1996.

Tsai was born in Shanghai on 1 May 1938. As a youth, he moved with his parents to Taiwan, where he graduated from Tunghai University in Taichung with a BSc in physics in 1960. He then studied at Dartmouth College, where he received a master's degree in physics in 1965. Finally, he went to Princeton University, where he studied under Thomas H. Stix at the plasma physics laboratory and was awarded a PhD in astrophysical sciences in 1969.

After completing his doctoral work, he served as assistant research physicist and lecturer for two years at the University of California, San Diego, where he worked on large-amplitude wave properties. He then spent two years as a fellow and a visiting research assistant professor at the University of Maryland at College Park, where he worked on nonlinear thermodynamic bounds.

Motivated by his deep love for China and his strong desire to help advance science in that country, he took a permanent position in 1973 as a research scientist at the Institute of Physics—a unit of the Chinese Academy of Sciences—in Beijing. There, he worked for the remaining 24 years of his scientific career, being promoted to the rank of professor in the 1980s. He served as the leader of the plasma theory group and also as the head of the plasma physics division. Concurrently, he held professorships at four other Chinese universities.

His research was in the areas of plasma physics, nuclear fusion and space plasmas. Especially well known

Among the ten individuals chosen to receive the first Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring were **Di-ola Bagayoko** of Southern University and A&M College in Baton Rouge, Louisiana, and **Janet S. Herman** of the University of Virginia at Charlottesville. President Clinton announced the awards in September.

Kenneth G. Purchase, a graduate student at the University of Illinois at Urbana-Champaign, has received the New Focus Research Award, given to doctoral candidates by New Focus Inc. The award will support his work on a distributed Bragg pulse shaper for ultrafast packet generation.



SHIH-TUNG TSAI

were his papers on the effects of energetic particles on tokamak stability; drift instabilities in general magnetically confined high-beta plasmas; and micro-instabilities and radiation in space plasmas.

He was very active in promoting the field of plasma physics and controlled nuclear fusion in China. In 1985, he founded the Association for Plasma Studies in China and served as its director. In that same year he established the China Summer School for Plasma Physics. He was also a member of the standing committee for the China Association of Nuclear Fusion and Plasma Physics, as well as a specially invited delegate of the China Association for Science and Technology. In 1987, he was appointed as a special member of the China Center of Advanced Science and Technology, headed by T. D. Lee and G. C. Zhou.

Tsai was also very active in promot-

ing international collaborations. In 1979, he participated in the Autumn College on Plasma Physics at the International Centre for Theoretical Physics in Trieste, Italy. He was again at the ICTP as a visiting member in the early 1990s. For purposes of collaborative research, he journeyed to the US a number of times for extended visits to the Princeton Plasma Physics Laboratory, the Institute for Fusion Studies at the University of Texas, the University of Maryland and the University of California, Irvine. He also spent extended periods of time at universities in Hong Kong and at Nanyang Technological University in Singapore. Last year, he participated in the creation of the Asia-Pacific Center for Theoretical Physics, and this year was a member of the executive committee for the 1996 Asia-Pacific Plasma Theory Conference.

In 1995, he was elected an Academician of the Chinese Academy of Sciences.

Shih-tung Tsai devoted his whole life to physics, to his family and to his motherland. He was an excellent plasma theorist with an international reputation, and will be fondly missed by many colleagues in several countries. In addition, he was noted for being kind and patient with his students and associates, a diligent learner and a tireless instructor. We have lost not only a true friend and an outstanding physicist, but also a genuinely sincere human being.

LIU CHEN

University of California, Irvine

CHUAN SHENG LIU

University of Maryland at College Park

JAMES W. VAN DAM

University of Texas at Austin

Michel M. Ter-Pogossian

Michel M. Ter-Pogossian, an internationally known pioneer in the use of cyclotron-produced radionuclides in biomedical research and an emeritus professor of radiology at Washington University's Mallinckrodt Institute of Radiology, died suddenly on 19 June 1996, while on a visit to Paris. He was 71 and the cause of death was a heart attack.

Ter-Pogossian was born in Berlin, Germany, but lived in France for most of his early years. He earned a BA degree in science from the University of Paris in 1943 and studied with Madame Jolie Curie at the Institute of Radium. Ter-Pogossian moved to St. Louis and became a graduate student at Washington University in the fall of 1946 and, while studying for a master's degree, worked in the physics department as a research assistant. He re-



MICHEL M. TER-POGOSSIAN

ceived his doctorate in nuclear physics in 1950 and joined the Mallinckrodt Institute faculty the same year. In 1961, he was appointed professor of radiation sciences. Ter-Pogossian also held a joint appointment as a professor of biophysics in physiology at the Washington University School of Medicine. In 1973, he was named head of the Mallinckrodt Institute's division of radiation sciences, but the self-proclaimed "research junkie" missed devoting his full time to laboratory work. In 1990, he stepped down from his administrative duties to return to his first love: research.

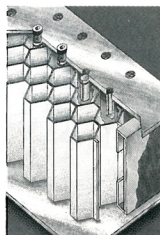
Ter-Pogossian's innovative research often resulted in improved medical imaging, including new methods of radiation therapy and brachytherapy and a nuclear medicine gamma camera (known as the "Ter-Pogossian camera").

Among his many accomplishments, he will be remembered above all as the "father of PET." In the early 1970s, he led a collaborative research team of physical scientists, chemists and physicians who developed the concept of positron emission tomography (PET). Ter-Pogossian played a major role in developing the concept of using short-lived isotopes in medicine, which had the advantage of allowing studies on patients to be done with low radiation doses. He directed the group at Washington University that designed and built the first PET scanner and the first multislice PET scanner, as well as the first time-of-flight PET scanner. Scientists who trained with Ter-Pogossian are now leaders in PET research at centers throughout the world.

Ter-Pogossian served on the editorial boards of major scientific journals, including the *American Journal of Roentgenology*, the *Journal of Nuclear Medicine* and the *Journal de Biophysique et Medecine Nucleaire*. He

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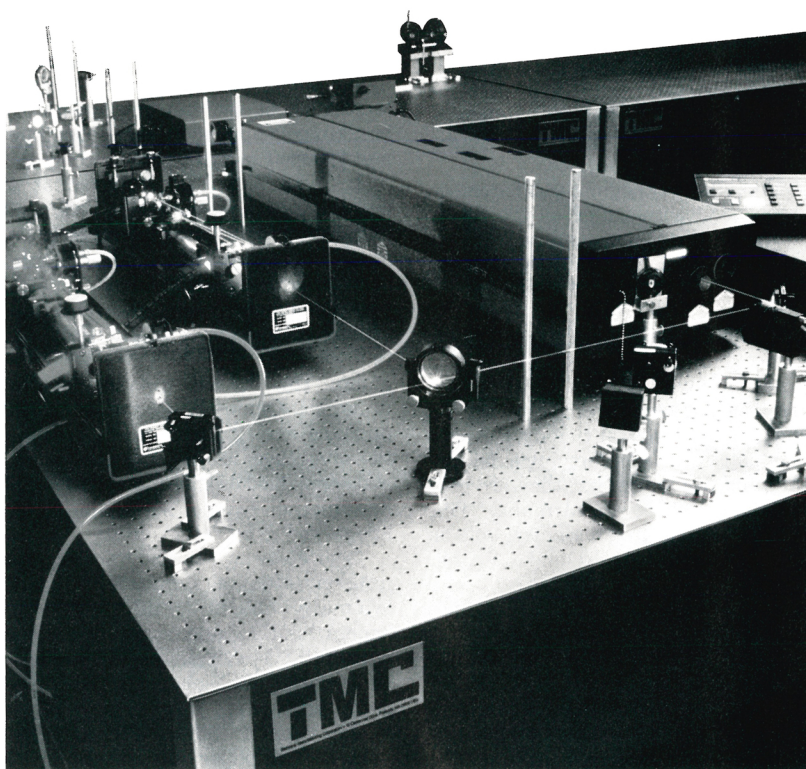
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was a past trustee of the Academy of Sciences of St. Louis, and served as an adviser to several Department of Energy and National Institutes of Health committees.

Michel Ter-Pogossian was widely traveled. As both a gourmet and an outstanding chef, he was known in and had dined at most of the world's top restaurants. He was an avid outdoorsman and an enthusiastic scuba diver. Ter-Pogossian had impeccable manners and was a true gentleman, in every sense of the word.

**MICHAEL J. WELCH
VICKI L. KUNKLER**

*Mallinckrodt Institute of Radiology
St. Louis, Missouri*

Viktor Isaakovich Ogievetsky

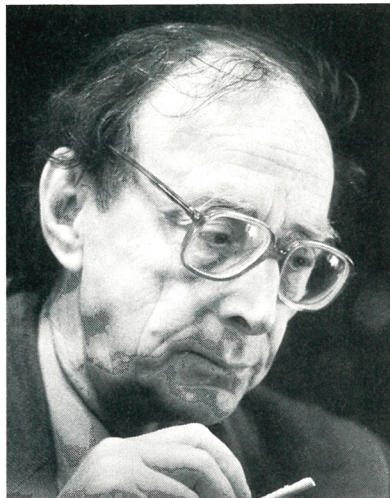
Viktor Isaakovich Ogievetsky, an eminent Russian theorist, passed away in Moscow on 23 March 1996.

Ogievetsky was born on 6 August 1928 in Dnepropetrovsk, USSR (now Ukraine). He attended Dnepropetrovsk State University, where he met Igor E. Tamm. This fortunate acquaintance determined his scientific interests and destiny. After graduating in physics in 1949, Ogievetsky began his career as a school teacher. Nevertheless, he was preoccupied by theoretical physics. In 1954, he received his PhD from the P. N. Lebedev Physics Institute in Moscow, and in 1956 he joined the just-founded Joint Institute for Nuclear Research in Dubna, near Moscow. He stayed in Dubna for the rest of his career. From the early 1970s until his death, Ogievetsky led the supersymmetry group in the institute's laboratory of theoretical physics.

From the very beginning of his career, Ogievetsky concentrated on the theory of symmetries of elementary particles. His first studies in this direction were devoted to the physics of K mesons.

In the early 1960s, in a close collaboration with his colleague Igor V. Polubarinov, Ogievetsky undertook a series of investigations of the field-theoretical treatment of gauge theories and gravity, based on viewing the relevant gauge fields as carrying a definite spin and assuming that they are generated by conserved currents. This approach played an essential role in enabling physicists to make further progress with gauge theories.

In the process of their studies, Ogievetsky and Polubarinov made discoveries whose significance became clear only years later. In 1965, for instance, they introduced the "notoph," an antisymmetric tensor gauge field that describes helicity 0, and is com-



VIKTOR ISAAKOVICH OGIEVETSKY

plementary to the photon field, which describes helicities ± 1 ; later, others rediscovered the notoph in the context of string theory. In 1964, Ogievetsky and Polubarinov found that spinor fields can be incorporated consistently into gravitation theory if the spinor transformation law is nonlinear in the metric. This result anticipated the general theory of nonlinear realizations later developed by Steven Weinberg, Dmitri Volkov and others.

After receiving his habilitation (qualification) in theoretical and mathematical physics in 1966 from the Joint Institute for Nuclear Research, Ogievetsky continued his work on symmetry principles in quantum field theory. He focused on the theory of nonlinear realizations and the closely related idea of spontaneous symmetry breaking, as applied to both spacetime and internal symmetries.

In 1973, Ogievetsky arrived at a novel and suggestive understanding of gravitation theory as the simultaneous nonlinear realization of two spontaneously broken finite-dimensional spacetime symmetries—the conformal and affine symmetries—which yield as their closure the full general covariance group. This statement is now referred to as "the Ogievetsky theorem." This profound analogy between the gravitation and gauge theories on the one hand, and sigma models of spontaneously broken internal symmetries on the other, has proved to be very fruitful.

Ogievetsky next turned to a new and unusual type of symmetry—supersymmetry. One of the first reviews of supersymmetry and superspace was written by Ogievetsky and Luca Mezincescu and published in 1979 in *Uspekhi fizicheskikh nauk* (English-language version: *Soviet Physics—Uspekhi*). This paper still stands out in

terms of the clarity and completeness of its exposition.

During the late 1960s and early 1970s, Ogievetsky created in Dubna a team of young researchers who were inspired by the beauty and clarity of his ideas on the superspace geometry of supersymmetric theories. His main achievement during that period was the geometric superfield formulation of $N = 1$ supergravity. His approach allowed him to construct a linearized off-shell superfield supergravity in 1977 and then to discover that the fundamental gauge group of supergravity is the group of diffeomorphisms of complex chiral $N = 1$ superspace. These results revealed for the first time the deep interrelations between supergravity and the theory of complex manifolds.

A natural extension of this work was the generalization of $N = 1$ superfield theories to the more complicated case of extended supersymmetry with a nontrivial internal symmetry group. Indeed, in 1984, Ogievetsky and the Dubna group proposed the concept of harmonic superspace, an enlargement of conventional superspace using the parameters of the internal symmetry group as coordinates.

Just before his death, Ogievetsky was very enthusiastic about his discovery that, in the framework of super self-duality, a self-consistent description of higher-spin fields becomes possible—something that is forbidden in conventional supersymmetric theories.

Ogievetsky left a large scientific school, with many students and colleagues who grieve over his unexpected and tragic passing. For them, he was not only their teacher but also an honest and principled person with a highly professional and creative attitude toward his science. His bright individuality, extraordinary amicability, kindness and frankness attracted to him colleagues and friends over the whole world.

Ogievetsky initiated fruitful and now well-established contacts between researchers in Dubna and many prominent scientists in the West. During his last years, he worked in many centers of theoretical physics abroad, where he often startled his new colleagues with the profundity of his mind.

We have lost a great scientist and a remarkable person.

JONATHAN BAGGER

ALEXANDER GALPERIN

*Johns Hopkins University
Baltimore, Maryland*

EUGENY IVANOV

*Joint Institute for Nuclear Research
Dubna, Russia*

EMERY SOKATCHEV

*Laboratory for Particle Physics
Annecy-le-Vieux, France*