elected are Claude J. Allegre, director of the Institut de Physique du Globe, University of Paris, Strasbourg, France; and Pavel A. Cherenkov, laboratory head and professor, Lebedev Physics Institute, USSR Academy of Sciences, Moscow. Altogether 233 foreign members have been elected to the Academy.

obituaries

John George Trump

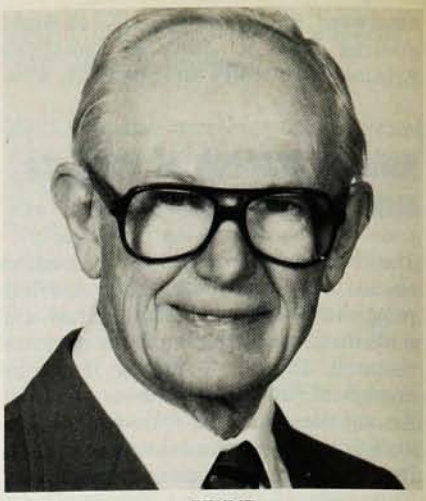
John G. Trump, professor emeritus of the Massachusetts Institute of Technology, died on 21 February 1985. He was born in New York in 1907 and received his DSc in electrical engineering from MIT in 1933. He then worked at MIT as a research associate until 1936, when he was made an assistant professor of electrical engineering. In 1952 he became a full professor.

Trump served as director of MIT's High-Voltage Research Laboratory from 1946–80. The unifying basis of his professional life was to maintain the highest reliable dc voltage per centimeter, both in vacuum and in gas pressure, for accelerator applications that he clearly foresaw both in medicine and in industry.

His first goal was a 2-million-volt pressurized x-ray generator that could be flexibly mounted in a hospital treatment room. With this he pioneered at MIT, in close cooperation with the Lahey Clinic physicians, the now widely used rotation therapy for cancer tumors with selective protection of adjacent healthy tissue. He designed many of the setups himself and gave daily supervision of patient treatments with the physicians. He developed modified accelerators for treating skin cancers with electrons. Concurrently, Trump taught special courses for hospital physicists in the Northeast.

Trump's war service orginated as technical aide to Karl Compton at MIT. He was on the Steering Committee of the Radiation Laboratory at MIT, and from 1944–45, director of the British Branch Radiation Lab at Great Malvern, following the American forces into Europe to assist in the best utilization of the centimeter radar and radio countermeasures they were using.

In 1946, Trump, Robert Van de Graaff and I founded the High Voltage Engineering Corporation to manufacture the compact Van de Graaff accelerators he was continuing to develop at MIT. He became the company's chairman and technical director and was intimately involved with Van de Graaff and many of their former students in



TRUMP

the positive-ion and tandem Van de Graaff accelerators designed and manufactured by HVE.

In 1962 he caused Electronized Chemicals Corporation to be reactivated as a subsidiary of HVE to make available in industry high-energy electrons, which he called "the beneficent particles of nature." Trump designed ECC's new facilities and remained active as its chairman until it merged with HVE. In 1974 he began at MIT a six-year study, under a National Science Foundation contract, of the economic feasibility of disinfecting liquid municipal sludge with energized electrons. He led a consortium of institutions and agencies in this endeavor and was actively pursuing this during the last year of his life.

An architecturally imposing reminder of Trump's work can be seen at Boston's Museum of Science in the Theater of Electricity, where he was largely responsible for the handsome electrostatic shielding of the 2-million-volt air-insulated generator, which was originally made by Van de Graaff himself in 1935. Trump was a life trustee of the museum. He took a great interest in the very short pulses of electricity generated by the Ion Physics Corporation, another subsidiary of HVE, and this later developed into pulse precipitation of stack gases, which may become of real importance in the problem of acid rain.

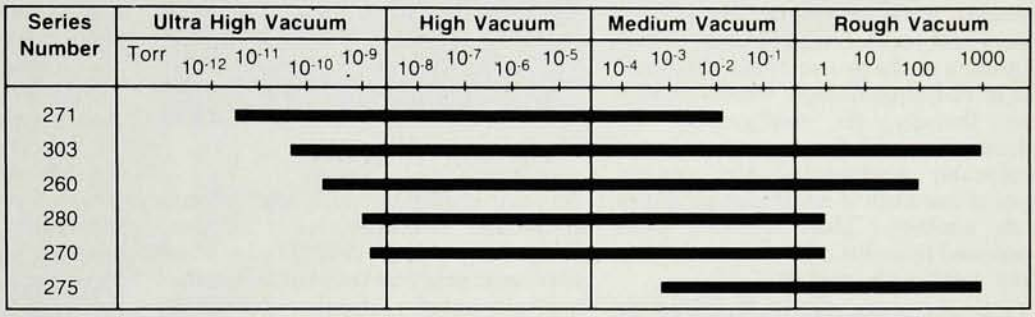
In 1984 he was chosen by the President's Committee on the National Medal of Science, and this medal was posthumously presented, in honor of his work, at the White House in March 1985.

Trump's remarkable personality mix contributed to all of this achievement and success. He was remarkably even-tempered, with kindness and consideration to all, never threatening or arrogant in manner, even when under high stress. He was outwardly and in appearance the mildest of men, with a convincing persuasiveness, carefully

Vacuum Professionals Rely On Granville-Phillips Gauge Controllers. A 30-Day Free Trial Will Show You Why.

Since 1954 we have specialized in the design and manufacture of certain vacuum system components. It is our only business. It is our only concern. We do not make systems, leak detectors or pumps — only gauge controllers, pressure controllers, gauge tubes, and valves. Although these products can represent a minor element of cost in any vacuum system, they are critical for excellent performance and results. Consequently, quality is of utmost importance, and to achieve it we allow no shortcuts or compromises.

GRANVILLE-PHILLIPS VACUUM GAUGE CONTROLLERS COVER THE RANGE FROM 10^{-12} TORR TO 1000 TORR.



Series Number	260	270	271	275	280	303
Standard						
Digital Display				X	X	X
Analog Display	X	X	X	X		
Auto-ranging	Opt'l	X	X	X	X	X
Analog output	X	X	X	X	X	Opt'l
Degas	I^2R	I^2R	EB	Not Req'd	I^2R	EB
Optional						
Gauges Operated Simultaneously	2	3	1 Only	1 Only	3	4
Process Control Set Points	2	4	2	2	4	12
Computer Interface				BCD	BCD	RS-232 BCD
Remote Setpoint Enabling						X

Note—Only principal features/functions are listed above. Many others are standard or available as options.

Preferred by Professionals

Our track record is a testimonial to our quality. We have hundreds of long-standing, repeat customers all over the world — a veritable "Who's Who" of vacuum. A recent survey reveals that more than 3 out of every 4 original equipment manufacturer prospects in the U.S. use Granville-Phillips products — most of them on an exclusive basis.

Now the Choice is Yours...

Here is your opportunity to see our gauge controllers in action. The depth, breadth and flexibility of our line permits you to satisfy a vast variety of applications. The charts can help you determine which product best meets your requirements; from the simple, low priced "workhorse" of the industry to the versatile programmable microprocessor-based controllers.

...And the Risk is Ours

You are the best judge of your needs and the means to satisfy them. There is no substitute for hands-on use of a product in the system and application under consideration. To help you achieve this goal we will schedule a no-obligation demonstration of the controller of your choice. We're so confident of our performance that we are offering a free "loaner" for 30 days to new potential users*. If not completely satisfied we'll pick it up with no questions asked. The choice is yours — the risk is ours. To take advantage of this offer, call Tim Feaver today at 303/443-7660 or 800/222-5577, or return the coupon to Granville-Phillips Co., 5675 East Arapahoe Avenue, Boulder, CO 80303.

*Offer expires October 30, 1985

I would like to take advantage of the 30-day free trial offer. I am a new potential user of the following controller(s):

_____

Name _____

Title _____

Company _____

Address _____

_____

Zip _____ Phone ( ) _____

Professionals Rely On

GRANVILLE-PHILLIPS

Circle number 44 on Reader Service Card

marshalling all his facts. Yet over and over, there was an obstinate optimisim that could fly in the face of all results and facts available to him and his coworkers. He cared very little for money and the trappings of money, but he did understand land; the land that he persuaded HVE to purchase in Burlington turned out to be worth as much as many years of the company's profitable output.

Trump's over 100 jointly and singly published papers and reports have brought to three generations of engineers and technicians his clear understanding of the geometry and arithmetic of radiation dosage, whether for x-ray therapy, for radiography, for disinfection and pasteurization or for molecular engineering—the conversion of one form of molecular structure into another. Much of this work stemmed from his own pioneer laboratory work with models.

DENIS M. ROBINSON
High Voltage Engineering Corporation

William L. McMillan

The death of William L. McMillan, professor of physics at the University of Illinois, Urbana–Champaign, on 30 August 1984, brought to an abrupt end a distinguished career in condensed-matter physics. Born 13 January 1936 in Little Rock, Arkansas, he died at age 48 at the peak of his productivity. In his last year McMillan had more than a dozen papers published or in the process of publication.

In 1964 McMillan received a doctorate in physics from the University of Illinois; his thesis on the ground state of liquid helium marked the first application of Monte Carlo methods to a quantum system. Using a variational technique, he calculated the energy, density, pair correlation function and condensate fraction in the zero-momentum state, obtaining results in remarkably good agreement with calculations done later by others with more powerful computers.

In late 1963, McMillan joined the theoretical physics research department at Bell Laboratories, where he worked on a variety of problems in superconductivity, liquid helium and liquid crystals. One of his earliest accomplishments was a computer calculation for deducing the electron–phonon interaction spectrum directly from the tunneling data of an experimental colleague, John Rowell, for which they were jointly awarded the Fritz London Prize. McMillan continued to work on the problem of strong coupling superconductors, which led to the widely used "McMillan T_c formula" and the "McMillan high-T_c limit" for superconductivity as trade-offs

McMILLAN

between strong coupling and phonon softening. While on leave at Cambridge University (1967–68), he wrote his classic paper on the proximity effect and reinvented a formalism for strongly coupled quantum fluids.

Around 1970, McMillan made the first of a number of dramatic plunges into an entirely new field: As a result of visits to Orsay, he became involved with liquid crystals, with their rich variety of phases. On returning to Bell Labs, he was so enthused with the idea of studying liquid crystals with x rays that he shifted from the theory department and set up his own laboratory. Before long, McMillan's experimental work spanned the entire gamut from chemical characterization (synthesis, chromatography) to state-of-the-art measurements on borrowed apparatus. He made pioneering x-ray studies of the critical fluctuations of the order parameter and the corresponding divergence of the transverse and longitudinal coherence lengths associated with the nematic to smectic-A and smectic-C phase transitions.

In 1972, McMillan returned to Urbana to join the staff of the physics department, where he remained until his death, except for a sabbatical year (1977–78) spent at Orsay. At Illinois, he continued to work for several years on both theoretical and experimental aspects of liquid crystals with his graduate students, expanding his experimental repertoire to include light scattering and heat capacity measurements. At the same time, he became deeply interested in the phenomenon of charge-density waves and electronically driven structural phase transitions, and their interaction with superconductivity in transition-metal dichalocogenides and the high-T_c A-15 compounds. This led to a series of papers on phenomenological Landau mean-field theories, both static and dynamic, which he later modified to include fluctuations. In doing so, he unearthed the relevance of domain walls (which he dubbed "discommensurations") in phases with incommensurate charge density waves.

McMillan's own experimental program made him both sensitive to and discerning of the significance of experimental results of other workers. In 1979, on seeing raw experimental data indicating the breakdown of Mott's model of minimum metallic conductivity, he proceeded to develop his own theory of electron localization in disordered metals. A year later, after realizing the importance of Coulomb interactions, he returned to the lab. As was his custom, he assembled his own apparatus and carried out tunneling measurements near the metal–insulator transition. On the basis of his experimental results McMillan constructed a new theory of the metal–insulator transition that included both electron localization and Coulomb interactions on an equal footing. He realized that disordered interacting electronic systems should be controlled by nontrivial fixed points to explain the tunneling data. This opened up the possibility of classifying their universality classes.

In 1981, McMillan turned to a long-planned project that fully engaged his experimental and theoretical skills. Using state-of-the-art arithmetic chips and a processor to control its microcode, he built a high-speed computer in his basement, explicitly for Monte Carlo calculations. It would run for days and even weeks, surviving both power failures and a flood.

During the last few years, McMillan worked on several of the outstanding problems of statistical mechanics, using sophisticated, modern, numerically based methods. He developed and exploited a variant of finite-size scaling, which he called the "macroscopic renormalization group."

McMillan is remembered not only as a great mind but also as a friend. Many of his friends at Murray Hill and Urbana have contributed to this account of his professional career; many more could.

JOHN BARDEEN
JACK MOCHEL
MICHAEL WORTIS
University of Illinois Urbana–Champaign
RAVINDRA BHATT
AT&T Bell Laboratories

Edward Lee Cooperman

Scientific exchange leads to mutual respect, then to trust, and eventually is important toward establishing peace between nations.
Edward Lee Cooperman

Edward Lee Cooperman, professor of physics and former chairman of the department of California State Univer-