

In Salute of Excellence

Vision, imagination, and innovation mark the careers and accomplishments of the winners of three important awards that recognize the contributions of physicists to applied research.

Dan A. Hays of Xerox Corp. has won the \$10,000 1997-1998 Prize for Industrial Applications of Physics from the American Institute of Physics (AIP) "for contributions to the physics of xerography resulting in three generations of innovative new copiers and printers." According to Xerox vice presidents Charles P. Holt and Charles B. Duke, "In 1996, products embodying development systems invented by Dr. Hays accounted for as much as 47% of Xerox revenues."

John P. McTague, vice president for technical affairs at Ford Motor Co., won the \$5,000 1998 George E. Pake Prize from the American Physical Society (APS) "for insightful experiments and contributions to the understanding of 2-D phase transitions and orientation epitaxy; and for major contributions in management science in government, national laboratories, and industry; and championing new paradigms for collaboration, such as the Partnership for Next Generation Vehicles."

John Clarke, professor of physics at the University of California, Berkeley, won the \$5,000 1998 Joseph F. Keithley Award for Advances in Measurement Science, also from APS, "for his experimental and theoretical studies of superconducting quantum interference devices (SQUIDS), advancing the state-of-the-art of measurement science by applying SQUIDS to many areas of both fundamental and applied physics such as high- T_c superconductor analyses, NMR amplifiers, and cryogenic comparators." Clarke is the first recipient of this new annual award. Hays accepted his award in October at the AIP's annual Corporate Associates meeting in Dallas. McTague and Clarke will receive their awards during the 1998 APS March meeting in Los Angeles.



The biennial Prize for Industrial Applications of Physics, established by AIP in 1977, honors individuals who have made outstanding contributions in industry through physics research. According to Edwin P. Przybylowicz, retired senior vice president and director of research at Eastman Kodak

Co., Hays has made not one but "three major contributions, which are generally recognized by the xerographic



**Three winners (left to right):
Dan A. Hays, John McTague,
and John Clarke.**

community"—in the areas of triboelectricity, magnetic brush development, and toner charge adhesions.

Hays joined Xerox's Wilson Center for Research and Technology in Webster, New

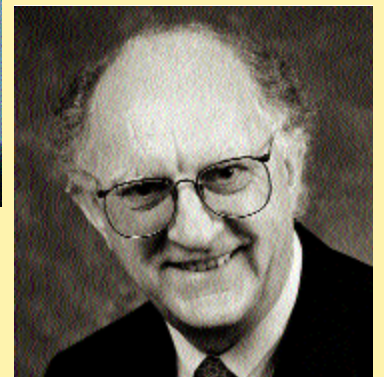
York, in 1968, after earning his doctorate in physics at Rutgers University, and he began his career of applying physics to advance the materials and processes associated with xerographic development. Building on his theoretical and experimental work of the 1970s, he designed a new high-performance development system that was first incorporated into the Xerox 1065. This xerographic legend was introduced in 1987. "Moreover, this new developer-system design has been incorporated in several additional major Xerox product platforms for copiers and printers," said Holt and Duke. "Dr. Hays is the father of the development-system technology that has done much to establish Xerox product leadership in high-speed, high-image-quality printing since the 1980s."

Hays has also invented a new class of development systems that Xerox plans to use

in two families of color printers that it expects to introduce during the next few years. "Thus, he personally has been responsible for the identification of the process physics and the design of development systems in three generations of Xerox products," Holt and Duke said.

The APS's George E. Pake Prize, endowed by Xerox Corp., recognizes outstanding work that combines original research in physics with leadership in the management of research or development in industry.

McTague, winner of the 1998 award, has pursued a varied career that has included industrial research, teaching at the University of California, Los Angeles (UCLA), and government service.



He joined Ford in 1986 as vice president for research after serving as acting science advisor to President Reagan, and he became vice president for technical affairs in 1990.

McTague's scientific feats include major contributions to elucidating the process of two-stage melting of materials and the discovery, with A. D. Novaco, of what is now called the Novaco-McTague effect, an important element in epitaxial growth. He also made the first measurements of the viscosity of dilute colloidal suspensions of single-domain ferromagnetic particles, which helped launch the field of ferrofluids and their applications.

From 1970 to 1982, McTague served on the UCLA faculty, rising to professor of chemistry, and as a member of the Institute of Geophysics and Planetary Physics. From there he became chairman of the National

Synchrotron Light Source department at Brookhaven National Laboratory, and from 1983 to 1986, he served as deputy director of the White House Office of Science and Technology Policy.

“His scientific career is best described by insightful, far-reaching interpretation of experimental results with a keen sense of what is important,” said L. Craig Davis, acting manager of the physics department at the Ford Research Laboratory.

At Ford, where his responsibilities include strategic planning of research and development, McTague championed the development of electric vehicles when many questioned the value of the effort. As an early proponent of R&D consortia, he was instrumental in the formation of the umbrella organization known as the U.S. Council for Automotive Research (USCAR), whose mission is to facilitate and promote precompetitive cooperative R&D among the Big Three U.S. automakers. These days, USCAR is coordinating the activities of consortia in such areas as structural composites, batteries, reduction of emissions, and the Partnership for a New Generation of Vehicles.

“His career in management has been characterized by vigorous and skillful advocacy of programs important to the organizations he has led,” Davis said.

The new Joseph F. Keithley Award, endowed by Keithley Instruments, Inc., and APS’s Instrument and Measurement Science Topical Group, recognizes physicists who have played an important role in the development of some equipment or measurement techniques that have brought about advances in physics.

Clarke received the Keithley Award for his pioneering and sustained contributions to the development and use of the SQUID. “John’s work over three decades on the development, understanding, and applications of SQUIDS has been nothing less than brilliant, the pursuit of applications intense,” said Robert C. Dynes, chancellor and professor of physics at the University of California, San Diego. “His development of the SQUID from a laboratory curiosity to a truly important device has been unique and single

minded,” Dynes added.

While a graduate student at the University of Cambridge in England, Clarke invented the SLUG, or superconducting low inductance undulating galvanometer, the first kind of SQUID to be used for practical measurements. “He has, since that time, been the leader in the world developing the SQUID...to where it will have significant impact” in detecting minute magnetic fields, Dynes said. “His work is a rare blend of basic science and important applications of his devices for instrumentation purposes.”

After earning his doctorate from Cambridge in 1968, Clarke went to Berkeley as a postdoctoral fellow and remained to attain the rank of professor. He currently holds the Luis W. Alvarez Memorial Chair for Experimental Physics. Five Berkeley colleagues noted that applications for SQUIDS today range from magnetocardiograms to the study of pairing symmetry in high- T_c superconductors. “It is fair to say that the SQUID is one of the most useful devices grown out of superconductivity,” they said.

Beyond leading the development of the SQUID, Clarke has made seminal contributions to the basic science of superconductivity and to several SQUID-related devices. “For example, in collaboration with Erwin L. Hahn and Alex Pines at Berkeley, John used SQUIDS as amplifiers for nuclear magnetic resonance and nuclear quadrupole resonance experiments. These amplifiers made it possible to observe ‘spin noise’ for the first time,” his colleagues said.

They also praised Clarke’s abilities as a mentor and educator: “John has produced a group of excellent students. Many of them are now well known scientists, and are all at least partly responsible for pushing the forefront of their field.”

The Forum department is initiated by the American Physical Society’s Forum on Industrial Applications in Physics (FIAP). For further information on FIAP, contact the chairperson, I. Craig Davis, MD3028 SLR, Ford Motor Co., Dearborn, MI 48121-2053; e-mail: ldavis7@ford.com; phone 313-322-7044.