

Applying the Fundamentals of Physics

Two physicists whose lengthy careers have yielded significant contributions to both basic science and industrial applications have been named winners of major American Physical Society (APS) awards.



Hendrik Brugt Gerhard Casimir (above) wins the 1999 APS George E. Pake Prize, and Simon Foner (right) wins the APS Joseph F. Keithley Award.

Hendrik Brugt Gerhard Casimir, former director of the Philips Research Laboratories in Eindhoven, The Netherlands, has been awarded the 1999 George E. Pake Prize “for excellence as a leader of industrial research at Royal Philips Electronics and for fundamental contributions to the foundation of quantum mechanics and solid-state physics.” According to Martin F. H. Schuurmans, managing director of Philips Research Laboratories, Casimir’s original thinking as a mathematician and physicist “broke the ground for an extremely broad range of scientific problems,” and his tenure as a research manager contributed “signifi-

cantly to the reputation for innovation” that Philips has today.

Simon Foner of the Massachusetts Institute of Technology’s (MIT’s) Francis Bitter Magnet Laboratory has been awarded the 1999 Joseph F. Keithley Award for Advances in Measurement Science. He was cited “for the invention and development of the vibrating sample magnetometer and many of its successful applications, and for the innovative development of very-high-field pulsed magnets.” The vibrating sample magnetometer (VSM) has been without doubt “the most ubiquitous piece of magnetic-characterization equipment in worldwide use for the past several decades,” said Richard M. Josephs, president



of Innovative Instrumentation, Inc., in Horsham, Pennsylvania.

Both awards carry a \$5,000 prize and a certificate of recognition. The Pake Prize is endowed by Xerox Corp. in honor of its for-

mer vice president of corporate research. The Keithley Award is named for the founder of Keithley Instruments, Inc., and is endowed by the company and APS’s Instrument and Measurement Science Topical Group.

Hendrik Casimir’s storied career as a theoretical physicist and industrial innovator dates back seven decades. As a student, he studied theoretical physics with Niels Bohr for more than a year. After earning his Ph.D. in 1931 from Leiden University in The Netherlands, Casimir worked with Wolfgang Pauli for two years, an influential time in his life that he still cites in his conversations and lectures. He returned to Leiden University as a researcher, and he was named a professor there in 1939 while actively studying both heat conduction and electrical conduction. He joined Philips in 1942, where he eventually became a member of the Philips board of

management and head of Philips’ research activities worldwide.

At Philips, Casimir contributed both as a scientist and as a manager. He published groundbreaking work in 1945 on Onsager’s principle of microscopic reversibility. Later, with D. Polder, he co-authored a now-famous paper on the dispersion forces acting between a neutral atom and a conduction plane, and between two atoms, which proved to have far-reaching implications for understanding the stability of colloids. His work on the representation of the field of spatially distributed electrical currents into a series of multipole fields laid the foundation for later, more extensive work on antennas that have arbitrary current distributions.

“As a physicist Casimir has had several seminal ideas which would prove to have a lasting influence,” said J. H. van der Waals, a professor of physics at Leiden University.

Casimir believed that a sound knowledge of basic theory is essential for research management and that solutions to practical prob-

lems may lead, in turn, to ideas that are unexpectedly fundamental, according to Schuurmans. He added that Casimir stimulated people by his knowledge and gave his researchers wide latitude in which projects they could pursue. “Professor Casimir is already a legend in his own right for the people in Philips and the European physics community,” Schuurmans said.

Simon Foner, a condensed matter physicist, conceived and developed his first VSM in the mid-1950s while a researcher at MIT’s Lincoln Laboratories, where he worked before moving to what was then the Francis Bitter National Magnet Laboratory. Princeton Applied Research brought the device to market a few years later, and today, 12 U.S. companies and 7 in Japan manufacture the devices, according to Robert P. Guertin, professor of physics at Tufts University. “There are now in use several thousand commercial-


ly manufactured VSMs, in addition to an unknown number of home-built instruments,” Guertin said.

“One of the great attractions of the VSM, beyond its obvious utility, is the basic simplicity of the design, enabling versions of it to be readily constructed by most graduate students,” Josephs said.

Two lesser known but seminal contributions of Foner are his development of the very-low-frequency VSM and his work in developing pulsed-field magnets—important research tools in such areas as condensed-matter physics—and the materials needed to make them more powerful.

Until Foner established his laboratory at MIT, the general availability of pulsed magnets for research in the United States “was essentially nil,” said Laurence J. Campbell of the National High Magnetic Field Laboratory at Los Alamos National Laboratory. “There is

no doubt that Si Foner, almost single-handedly, kept the United States on the world map in pulsed-field generation and research for many years.”

“I think Si always regarded his magnets as secondary to the measurements they allowed him to perform,” Campbell added. “Fortunately, his position at the MIT magnet lab afforded him almost every conceivable measurement opportunity from the stream of users passing through.” Although Foner formally retired in 1997, he continues his work as a visiting scientist at the Francis Bitter Magnet Laboratory. 

The Forum department is initiated by the American Physical Society’s Forum on Industrial and Applied Physics (FIAP). For further information on FIAP, please contact the chairperson, John M. Rowell (jmrberkhts@aol.com).