

land, Ohio, joined the faculty of the University of Akron, Ohio, in August as professor of polymer science.

The winners of this year's Carl Zeiss Research Award, which is given in recognition of "outstanding work in the fields of optics and glass technology," are **Ursula Schmidt-Erfurth**, professor and doctor at the Medical University of Lübeck in Germany, and **Shuji Nakamura**, professor in the materials department at the University of California, Santa Barbara. The Carl Zeiss Foundation presented the award in June to Schmidt-Erfurth for her work in developing the basic principles behind photodynamic therapy for the eye and to Nakamura for his development of high-brightness blue light-emitting diodes and laser diodes, which permit applications such as full-color displays and full-color indicators. The award winners will split the prize money of DM 50 000 (about \$24 000).

Jonathon Howard has accepted a position as director of the Max Planck Institute of Molecular Cell Biology and Genetics, which is under construction in Dresden, Germany, and is expected to be completed in early 2001. Howard currently is professor of physiology and biophysics at the University of Washington, Seattle. **Kai Simons** also accepted a position at the institute: Earlier this year, he became the executive director. He had been program coordinator for the cell biology program at the European Molecular Biology Laboratory in Heidelberg, Germany.

At its annual meeting in San Diego, California, in July, Fusion Power Associates announced the four winners of its Distinguished Career Award, given to individuals whose lifelong career contributions have benefited fusion development. **Alan Gibson**, retired deputy director and head of the torus and measurement department at the Joint European Torus (JET) laboratory in the UK, was recognized "for his seminal research contributions to fusion," according to the awards announcement. **Tom Simonen**, retired vice president in the fusion group and director of the DIII-D national fusion program at General Atomics, was honored for his "many solid scientific contributions and leadership of major fusion research facilities over many decades." **Ken Tomabechi**, honorary research adviser at the Central

Research Institute of Electric Power Industry in Tokyo, was recognized for making "essential contributions . . . to fusion international collaboration."

Alvin W. Trivelpiece, retired director of Oak Ridge National Laboratory, was acknowledged as "a pioneering researcher, university professor, and top-level manager in both the private and public sectors."

In June, former National Science Foundation director **John Brooks Slaughter** was named president and chief executive officer of the National Action Council for Minorities in Engineering, Inc, in New York.

The Alexander von Humboldt Foundation in Bonn, Germany, in June gave its Humboldt Research Award for Senior US Scientists to **Neville Smith**, division deputy of science at The Advanced Light Source, a division of Lawrence Berkeley National Laboratory. To promote international scientific cooperation, the foundation invites award winners to spend extended periods at research institutes in Germany. Smith will be working with **Wolfgang Eberhardt** on magnoelectronics at the Jülich Research Center in Jülich, Germany.

In April, the German Physical Society gained a new president: **Dirk Basting**, president and chief executive officer of Lambda Physik, headquartered in Göttingen, Germany. Basting succeeds **Alexander M. Bradshaw**, scientific director of the Max Planck Institute for Plasma Physics in Garching, Germany, who now serves as the society's vice president.

OBITUARIES

Hendrik Brugt Gerhard Casimir

Hendrik Brugt Gerhard Casimir, a brilliant scientist and leader of industrial research, died on 4 May in Heeze, the Netherlands, after a brief illness.

Born in The Hague on 15 July 1909, Casimir was endowed with a strong body, fabulous memory, and great intelligence. As a student of Paul Ehrenfest at Leiden University, he studied theoretical physics. But he

The Washington Academy of Sciences presented its annual award for Distinguished Achievement in the Physical Sciences to **Katharine B. Gebbie**, director of the physics laboratory at NIST in Gaithersburg, Maryland, and selected her as a fellow of the academy this past May. According to the academy, Gebbie was recognized for "initiating now world-leading programs in nanotechnology, atom interferometry, atom optics, quantum metrology, and quantum computation."

In May, **Richard Osgood Jr** was named associate laboratory director for basic energy sciences at Brookhaven National Laboratory. Osgood retains an appointment as Higgins Professor of Electrical Engineering and of Applied Physics at Columbia University.

The Association of Universities for Research in Astronomy, Inc, has appointed **Jean-René Roy** as associate director of the Gemini North Observatory on Hawaii's Mauna Kea. Roy, a professor at the University of Laval in Quebec City, Quebec, Canada, will begin his new position in October.

The Inamori Foundation in Kyoto, Japan, has announced that computer scientist **Charles Antony Richard Hoare**, professor emeritus at the University of Oxford, has won the Kyoto Prize in advanced technology for his "pioneering and fundamental contributions to software science." Kyoto Prizes are given annually to individuals or groups who have "contributed greatly to mankind's scientific, cultural, and spiritual betterment."

also spent 18 months of his graduate education in Copenhagen as a student of Ehrenfest's close friend Niels Bohr. Casimir's PhD thesis, which he completed in 1931, dealt with the quantum mechanics of a rigid spinning body and the group theory of the rotations of molecules.

After earning his PhD, Casimir became extremely active in the young field of quantum mechanics. For example, he used Heisenberg's matrix mechanics to establish a relation between natural line width and radiation damping. He also used the time-



HENDRIK BRUGT GERHARD CASIMIR

dependent Schrödinger equation to treat the diffusion of an alpha particle from a Gamov potential well. And he proposed the hypothesis that the nucleus contains an electrical quadrupole, thereby accounting for the hyperfine structure of europium.

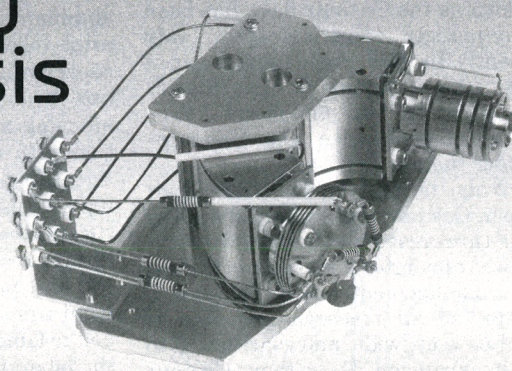
Casimir spent the years 1932–33 with Wolfgang Pauli in Zürich, an experience that had a lasting and far-reaching influence on him. Casimir loved to recount his relationship with Pauli and would include anecdotes from that period in most of his seminars in later life.

After Ehrenfest's untimely death in 1933, Casimir returned to Leiden, where he continued to be active in both physics and mathematics. With the physicist Evert Gorter, he worked out the thermodynamic theory of superconductive states. With the mathematician Bartel van der Waerden, he proved the complete reducibility of the representations of semi-simple Lie groups. In addition, he worked on the thermodynamic interpretation of paramagnetic relaxation phenomena with Frits du Pré. This work forms the basis for the introduction of the notion that the temperature of a magnetic system is different from the lattice temperature.

In 1938, he became a physics professor at Leiden University. At that time, he was actively studying both heat conduction and electrical conduction, and contributed to the attainment of millikelvin temperatures.

In 1942, during World War II, Casimir moved to the Philips Research Laboratories in Eindhoven, the Netherlands. He remained an active scientist and in 1945 wrote a well-known paper on Lars Onsager's

electrostatic energy analysis



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principle of microscopic reversibility.

In 1948, he published a famous paper with Dik Polder on the influence of retardation on the London-van der Waals forces. What is now known as the Casimir force has been convincingly demonstrated only recently. In 1996, Steve Lamoreaux at Los Alamos National Laboratories measured the force and found it to be in agreement with the Casimir-Polder theory.

When he and Polder wrote their paper, Casimir was already one of the labs' three research directors. In 1957, he was appointed a member of Philips Co's management board. He was in charge of all research activities of Philips worldwide, and contributed to their expansion. Even then, Casimir continued to be scientifically active. An interesting example is his work with Chris Bouwkamp on the representation of the field of spatially distributed electrical currents into a series of multipole fields. This work formed the basis for extensive work on antennas with arbitrary current distributions.

In this period he also laid the foundation for what came to be known as the science-technology spiral. Technology uses science with a time delay of, say, 10 years; science in turn is driven by new developments in technology; and both progress together. For example, radio lamps made it possible for new aspects of atomic and nuclear physics to be researched. The resulting science-technology spiral is largely responsible for the great technology progress of the previous century. A much more comprehensive description of Casimir's views (and an excellent book) can be found in his autobiography *Haphazard Reality—Half a Century of Science* (Harper & Row, 1983).

The Philips labs had been isolated from the rest of the world during World War II. Consequently, catching up in science and technology was paramount. With that aim, Casimir strongly cultivated contacts with colleagues from other scientific centers and industry all over the world. In this effort, he drew on his impressive fluency in several languages and his deep conviction that "research is essentially an international activity, and that repetition and duplication are useless!"

Within the company, Casimir did not put many restricting boundary conditions on suggestions for programs of work, provided they were potentially of interest to Philips and not merely, as he put it, "advanced

classroom experiments." He was able to stimulate people by knowledgeable hints for progress in widely diverging fields, avoiding short-term interference with their affairs. Casimir's abundant knowledge of science (and arts!) together with his extraordinary capacity for dissecting the most intricate problems, often by the use of amusing metaphors, made conversation with him on the bottlenecks in scientific progress not only entertaining but also effective. He contributed substantially to an atmosphere at the Philips research facility that was fertile and productive. After his retirement from Philips in 1972, he continued to foment research by coming into the laboratory in Eindhoven and asking young people "What is new in physics and what can we learn from it?" As a young physicist at Philips, I was greatly stimulated by such conversations.

Casimir was active on the Dutch and European physics and industry scenes. He was involved in the founding of the European Physical Society in 1968, and after his retirement from the Philips board of management in 1972, he became president of that society. He was also one of the founders and the first chairman of the European Industrial Research Management Association (EIRMA).

Casimir loved strenuous walking in mountainous areas, eating good food, and playing the violin. With his extraordinary memory, he recited by heart poems to his children, and used poems in his lectures. He loved a good chat with people from almost any discipline, particularly the arts or literature. He visibly and deeply loved his wife and five children, and they formed a fine family.

Casimir was awarded many prizes and honors. Most recent was the American Physical Society's George E. Pake Prize for outstanding scientific and industrial research leadership. With the death of Henk Casimir, we have lost one of the most gifted scientists and industrial research leaders of the century.

MARTIN SCHUURMANS

Philips Research
Eindhoven, The Netherlands

David George Crighton

David George Crighton, one of the most influential, inspiring, and popular figures in fluid mechanics,

died of cancer in Cambridge, England, on 12 April. He was head of the department of applied mathematics and theoretical physics (DAMTP) at the University of Cambridge for nine years and master of Jesus College, Cambridge for three years.

Crighton was born on 15 November 1942 in Llandudno, North Wales, to which his parents had been evacuated in World War II to avoid German bombing. Christened David (but not Lloyd!) George, and claiming no Welsh ancestry, he captained his school at rugby and won a mathematics scholarship to Cambridge. He graduated as a top student in 1964.

In his first position, as a lecturer at Woolwich Polytechnic, Crighton taught mathematics to mature students in night school, where, he claimed, he mastered the elements of crowd control. But, having reached the top of that career path by the age of 24, he switched his sights to research. In 1967, he joined my group in the mathematics department of Imperial College as a research assistant.

With characteristic boldness, Crighton wanted to study the origin of turbulence. As his adviser, however, I was determined not to allow my obviously talented student to waste time on such an intractable subject, and I argued that the effects of turbulence formed a more suitable topic. He agreed, and worked instead on the effect of bubbles on the noise of underwater turbulence. His first paper demonstrated, with a hint of disappointment, that compressible homogeneous turbulence has no terrestrial scale application. His second widely quoted paper predicted that bubbles do indeed have a startling effect on the noise of underwater turbulence. He earned his PhD in 1969.

Two specific problems formed the context of Crighton's work: quieting the Concorde's excessively noisy take-off and limiting the underwater sound by which submarines could be detected. In tackling both problems, he mounted the most vibrant attack on the aeronautical noise problem and its underwater counterpart. He was superb at finding new techniques of analysis with which to model novel sound sources and, by correlating his results with experiment, he made an enormous contribution to the subject. His use of singular perturbation and matched asymptotic expansions laid solid foundations for wave analysis, and naval interests, both in the UK and the US, consulted him a great deal. For example, he helped British admiralty experts reduce the sound of