

Physical Society will recognize the following individuals for their achievements in physics.

**Klaus Hepp** will receive the Max Planck Medal, the society's highest award for theoretical physics, for his "path-breaking contributions to quantum field theory and his research in the areas of laser physics and neuroscience." Hepp is a professor emeritus of theoretical physics at ETH Zürich.

The society's top honor for experimental physics, the Stern–Gerlach Medal, will go to **Frank Steglich**, director of the Max Planck Institute for Chemical Physics of Solids in Dresden. He is being recognized for his "pioneering discovery of superconductivity in the heavy-fermion metal  $\text{CeCu}_2\text{Si}_2$  and for his seminal contributions to condensed matter physics, in particular, magnetism and superconductivity in strongly correlated electron systems."

The Gentner–Kastler Prize, awarded jointly by the German Physical Society and the French Physical Society, will go to **Dominique Langevin** for her "outstanding contributions to soft matter physics, including emulsions, foams and such phenomena [as] capillary waves." She is a professor at the Laboratory of Solid State Physics at the University of Paris–South in Orsay, France.

**Klaus Blaum** will receive the Gustav–Hertz Prize for his "excellent research on the measurement of the masses of short-lived atomic nuclei." He is a research fellow at CERN in Geneva, Switzerland.

**Hans-Joachim Wilke**, professor of physics education at the Technical University of Dresden, will receive the Robert Wichard Pohl Prize for his "outstanding contributions to physics education and for communicating physics to the general public."

The Walter Schottky Prize will be presented to **Markus Morgenstern**. A senior scientist in the Institute of Applied Physics at the University of Hamburg, he is being honored for his "excellent research on the electronic properties of semiconductors."

**Myrjam Winning**, who is completing her *habilitation* thesis and is a leader of the crystal plasticity research group at the Institute of Physical Metallurgy and Metal Physics at the University of Aachen, will receive the Hertha Sponer Prize. She is cited for her "seminal contributions to metallurgy and material sciences, in particular for her research on grain boundaries."

During a ceremony in January, **Matthias Scheffler** was honored with the Max Born Prize, given jointly

by the German Physical Society and the UK's Institute of Physics. He was cited for his "outstanding contributions to theoretical surface physics, in particular for the combination of density-

functional theory and statistical mechanics to describe crystal growth and catalysis processes." Scheffler is director of the Fritz Haber Institute of the Max Planck Society in Berlin.

## Obituaries

### Hermann Anton Haus

**H**ermann Anton Haus, a prolific contributor to emerging technologies in optics for more than 50 years, died on 21 May 2003 of a heart attack at his home in Lexington, Massachusetts, following his routine bicycle commute from MIT.

Hermann was born in Ljubljana, Slovenia, on 8 August 1925. When the Communists expelled the German-speaking population from Yugoslavia shortly after the end of World War II, Hermann and his mother were taken from their home in the middle of the night and shipped by rail to Austria with other refugees. On the refugee train, he met a chemist who had lost a lifetime's worth of notes. Then, Hermann said, he realized that the only thing you can count on is the knowledge you carry in your head. That realization inspired his love for elegant theoretical descriptions that he could derive from basic principles, and his insistence on giving his classroom lectures without notes.

After beginning his university studies in Austria, Hermann wrote to General Mark Clark, commander of US forces, to ask for help in getting to the US. According to Hermann, his English was passable at that point. He had learned it by reading *Gone With the Wind*. After attending the Technical University of Graz and the Technical University of Vienna, he came to this country and received his BS from Union College in Schenectady, New York, in 1949. In 1951, he was graduated from Rensselaer Polytechnic Institute with an MS in electrical engineering and came to MIT, where he earned his DSc in the same field. His thesis research, under L. J. Chu, focused on the propagation of signals and noise along electron beams at microwave frequencies.

Hermann joined the electrical engineering faculty at MIT in 1954. He was promoted to associate professor in 1958, to professor in 1962, to Elihu Thomson Professor in 1973, and to Institute Professor in 1987.

The study of noise was an early and recurrent theme in Hermann's research. In his graduate work and as a



Hermann Anton Haus

young professor in the 1950s, Hermann investigated noise in microwave traveling wave tubes and other electronic amplifiers, obtained simple formulations for optimum performance, and, with Richard Adler, established the concept of "noise measure." In the 1960s, shortly after the invention of the laser, he extended his studies to quantum systems, and he and James Mullen showed that the noise power in a single mode amplifier, with gain  $G$  and bandwidth  $B$ , had to be greater than  $(G - 1)\hbar\omega_0 B$ . With Charles Freed, he carried out the first experimental observations of quantum noise in a laser oscillator by showing that the photon statistics in a helium–neon laser changed from degenerate Bose–Einstein below threshold to Poisson above.

In the 1970s, Hermann produced his seminal and definitive analyses of modelocking, the process by which short pulses are generated in lasers. His "slow absorber" theory provided the basis for the description of dye laser systems that produced the first subpicosecond pulses and for his demonstration of the picosecond modelocked semiconductor diode laser. His "fast absorber" theory, which he developed to describe early solid-state laser experiments, has become—with its extension to additive pulse modelocking and Kerr lens modelocking—the basis

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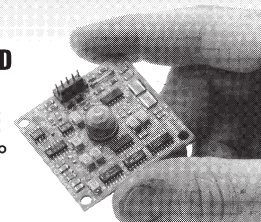



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for analyzing present-day femto-second lasers. Hermann also began a series of significant accomplishments in integrated optics: He produced original analyses of waveguide coupling, invented the quarter-wave shift for distributed feedback devices, and invented and demonstrated the non-linear waveguide Mach-Zehnder switch for ultrafast all-optical logic.

Hermann returned to the subject of noise in lasers and in optical fiber transmission systems during the 1980s. With Jim Gordon, he showed that quantum noise introduced by optical amplifiers places a limit on the long-distance transmission of solitons by causing timing jitter (the Gordon-Haus effect), and then, with Antonio Mecozzi, showed that the limitation could be overcome with the use of filters. In the early 1990s, with his student Yinchieh Lai, Hermann first developed theories for soliton squeezing and the quantum fluctuations of solitons.

The importance of Hermann's pioneering work became increasingly evident in recent years. He remained at the forefront of progress in the field. With students and colleagues at MIT, he carried out dramatic demonstrations of the squeezing of vacuum fluctuations in optical fibers and, in 2001, achieved signal noise reduction to as much as 6.1 dB below shot noise. He invented novel modelocked fiber lasers and provided theory for the operation of less-than-two-cycle pulse lasers. He pioneered the development of compact, high-index-contrast photonic circuits and cowrote the book *Passive Components for Dense Optical Integration* (Kluwer Academic, 2002) with Christina Manolatu. In a matter of months, he wrote his 560-page book *Electromagnetic Noise and Quantum Optical Measurements* (Springer, 2000) to present a unified description of classical and quantum noise. Of his more than 380 journal publications, he wrote an astounding 200 after age 65.

Hermann received many prizes and honorary degrees and was elected to both the National Academy of Engineering and the National Academy of Sciences. An immigrant who was deeply grateful for everything this country had permitted him to achieve, Hermann was particularly proud to receive the National Medal of Science from President Bill Clinton in 1995.

Hermann was an enthusiastic and devoted teacher. During each of the last six decades of his life, he taught both undergraduate and graduate courses, inspiring generations of students at every level. At the same time, he taught all of us—colleagues, stu-

dents, and friends—about much more than science. We were awed by his command of literature, history, and language, and by his energy. He biked to and from work every day. He led us on long hikes and across-the-lake swims. We followed him to lectures on the cosmos, to local museums and art exhibits, and on his tour of campus sculpture. His door was always open and he always had time for us. He was a great colleague, mentor, and friend.

**Erich P. Ippen**

Massachusetts Institute of Technology  
Cambridge

## Joseph Fine

Joseph Fine, a NIST physicist who was best known for his work in the interaction of energetic ions with surfaces, died on 11 January 2003 in Silver Spring, Maryland, after a long struggle with cancer.

Fine was born in Montreal, Canada, on 7 August 1931; his family emigrated to the US when he was four years old. His interest in physics bloomed early, and he won first prize for his science fair project in the Georgia Science Talent Search. Fine received his BS (1953) and MS (1955), both in physics, from Emory University. In 1958, after having served two years in the US Army, he joined the National Bureau of Standards (now NIST) in Washington, DC. His initial work was in the free radicals program. With the encouragement of his boss, Milton Scheer, he pursued a PhD in theoretical physics at the Catholic University of America, and received his doctorate in 1974 under Tomoyasu Tanaka. His thesis, on two-electron systems and the formation of positive and negative ion states, inspired an interest in ion interactions. He pursued that interest experimentally at NBS/NIST for the rest of his career, first in the physical chemistry division and later in the surface science division.

Fine began investigating ion scattering from surfaces at a time when very little was understood about the physics of high-energy sputtering. He studied the mechanism of surface roughening that resulted from ion bombardment and determined the rate at which diffusion was enhanced by the creation of long-lived defects. Having obtained the deexcitation spectra of sputtered metal atoms from their Auger emission, he discovered that many of the atoms remained excited long after leaving the surface. With several collaborators, he also studied the continuum spectrum of electrons produced as a result of ion bombardment.