

Wolf prizes in physics for Hahn, Hirsch and Maiman

The Wolf Foundation of Herzlia, Israel, has announced the recipients of its prizes in physics and mathematics. The prize in physics goes to Erwin L. Hahn, Sir Peter Hirsch and Theodore H. Maiman for "their distinct pioneering contributions in the field of experimental condensed-matter physics." The prize in mathematics will be shared by Shiing-Shen Chern and Paul Erdos.

Hahn, professor of physics at the University of California, Berkeley, receives the prize "for his discovery of nuclear spin echoes and for the phenomenon of self-induced transparency." Educated at Juniata College (BS 1943) and the University of Illinois (MS 1947, PhD 1949), Hahn worked at Stanford (1950-52) and at IBM (1952-55) before going to Berkeley. He has worked on nuclear and electron spin magnetic resonance, electronic instrumentation, electron and nuclear spin resonance coupling in molecules and solids, and laser physics.

Hahn's work on spin echoes dates from the early 1950s and expands on the pre-war discovery of nuclear magnetic resonance by Felix Bloch and Edward Purcell. Hahn discovered that by appropriately timing pulses of rf,

the precession of the nuclei can be effectively synchronized, so that at a later time the precessing spins line up to produce a spin echo. Both the timing and magnitude of these echoes provide significant information about the spins, information that is now being applied to obtain, for example, functional pictures of organs and tissues in the living body. Analogous echoes are also seen with optical pumping by lasers.

Hirsch, professor of metallurgy at Oxford University, receives the prize "for his development and the utilization of the scanning electron microscope as a universal instrument to study the structure of condensed matter." Hirsch was born in Berlin, Germany, and was educated at Cambridge University (BA 1946, MA 1950, PhD 1959). He subsequently worked at Cambridge until 1966, when he was named Isaak Wolfson Professor at Oxford University.

Most of Hirsch's professional career has been devoted to electron microscopy as a tool for materials science. He is the coauthor (in 1965) of *Electron Microscopy of Thin Crystals*, and he is particularly noted for his early studies of dislocations and work hardening in

crystals.

Maiman, vice president for advanced technology at TRW, Inc., in Los Angeles, receives the prize "for his realization of the first operating laser, the pulsed three-level ruby laser." After receiving his BS from the University of Colorado in 1949, Maiman went to Stanford, where he received his MS in 1951 and his PhD—under the supervision of Willis Lamb—in 1955. He subsequently worked at the Hughes Research Laboratories, where he invented the ruby laser. Maiman's work was based on the earlier microwave work of Arthur Schawlow, Charles H. Townes and Nicolaas Bloembergen. While ruby was already in use in microwave devices, it had been rejected for use in optical amplification; Maiman recognized, however, that the quantum efficiency of ruby fluorescence was large enough to make it a promising substrate for a laser.

In 1962 he left Hughes to form the Korad Corporation to develop and manufacture high-power lasers. After Korad was acquired by Union Carbide in 1968, Maiman formed his own consulting firm; he moved to TRW in 1976. In addition to his work on lasers, Maiman has worked on devices for

HAHN



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electronic communications (modems) and color video displays.

Chern, professor emeritus of mathematics at Berkeley, receives his share of the mathematics prize for "his outstanding contributions to global differential geometry, which have profoundly influenced mathematics. Much of Chern's work on differential geometry also has important implications for the gauge fields that form the basis for much of the current theory of elementary particles. Chern has recently also been honored by the American Math-

ematical Society for his work (see *PHYSICS TODAY*, January, page 93).

Erdos, who is at the Mathematical Institute of the Hungarian Academy of Sciences in Budapest, is being honored with his share of the mathematics prize for his "numerous contributions to number theory, combinatorics, probability, set theory, and mathematical analysis, and for personally stimulating mathematics the world over." He received his DSc from the University of Manchester, and worked principally in the US from 1938 to 1954.

sonable and engagingly direct." The award marks the first time an author has received the Pfizer award more than once: Westfall also received a Pfizer Award for *Force in Newton's Physics* in 1972.

Westfall devoted more than 20 years to the study of Newton's life and work and extensively examined Newton's surviving manuscripts. But, he writes, "The more I studied him, the more Newton receded from me."

1983 Simon Prize to David O. Edwards

The Institute of Physics has awarded the 1983 Simon Prize for distinguished work in low-temperature physics to David O. Edwards of Ohio State University for his outstanding research on liquid and solid helium and their surfaces.

Edwards was a senior Hulme scholar at Brasenose College, Oxford, and received his bachelor's degree in 1953. He did his graduate work at Oxford's Clarendon Laboratory under the supervision of Kurt Mendelssohn, receiving his DPhil 1957. After a postdoctoral fellowship at Oxford, Edwards joined the low-temperature lab at Ohio State in 1958, becoming professor of physics in 1965.

His first work, carried out in collaboration with Douglas Brewer, was an investigation of heat transfer by internal convection in liquid He⁴, which involves both a normal-fluid flow and an oppositely directed superfluid flow. In these experiments Edwards and his colleagues were able to see the fluctuations and hysteresis associated with superfluid turbulence.

At Ohio State, Edwards and his collaborators confirmed a prediction by Isaak Y. Pomeranchuk that the helium-3 melting curve should have a minimum. The verification of the minimum—at 0.3 K—required the experimenters to develop techniques to measure the pressure of liquid helium at temperatures where it is isolated in the sample tube by plugs of slightly warmer (nearer 0.3 K) solid helium.

Edwards also played a very important part in the understanding of He³-He⁴ mixtures and thus in the development of dilution refrigerators, which have transformed low-temperature technology. A liquid mixture of He³ and He⁴ separates into two phases at low temperatures: One phase, rich in He³, acts as a quasiliquid; the other acts as a quasigas. Moving He³ from quasiliquid to quasigas ("evaporation") cools the system. It has been assumed from the third law of thermodynamics that the He³ concentration of the quasigas would go to zero as the temperature fell, so that the dilution refrigerator

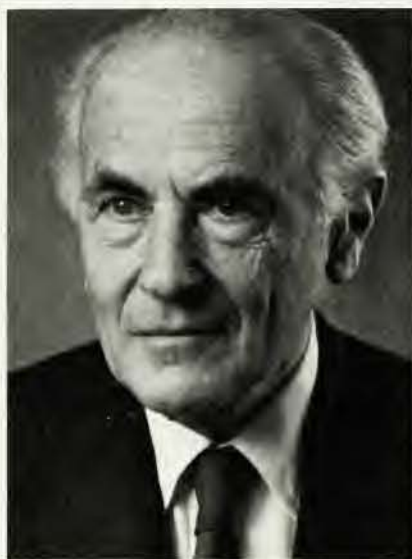
Eirich receives Bingham medal

Frederick Roland Eirich has received the Eugene Cook Bingham Medal for 1983 from the Society of Rheology in recognition of his excellent contribution to rheology.

Eirich was born in Austria in 1905. He studied chemistry at the University of Vienna and obtained his PhD in 1929 and his *Habilitation* in 1938. His thesis, on colloidal gold, was written under the supervision of Wolfgang Pauli, one of the most prominent colloid chemists of the period and father of the Nobel laureate in physics.

In 1932, Eirich joined Herman Mark, who was assembling an interdisciplinary research team at Vienna in the field of natural and synthetic polymers. While there, Eirich focused on the viscosity of dilute solutions, and also established a small group devoted to the study of molecular hydrodynamics.

The German *Anschluss* of Austria led Eirich to emigrate to England, where he joined Sir Eric Rideal at Cambridge. There he continued his work on the fundamental aspects of colloidal suspensions, with emphasis on their rheological properties. In 1940 he went to Australia, where he worked on a variety of problems concerning flow and tribochemistry. Returning to England in 1943, he again took up his teaching and research activities at Cambridge, until, in 1947, he rejoined Herman Mark at what is now the Polytechnic Institute of New York, in Brooklyn. In Brooklyn, Eirich's group worked on a wide range of topics in the field of polymers, again with emphasis on transport phenomena, the relation-



EIRICH

ship between structure and physical properties, general rheology and mechanical testing, absorption and adhesion, and the properties of polyelectrolytes. Recently, stimulated by the work of T. L. Smith and M. L. Williams, Eirich has made contributions to the molecular aspects of the rupture polymers.

Eirich's influence has also been felt through his work as editor of the five volumes of *Rheology: Theory and Applications*, a series of symposia on high-speed testing, and the *Transactions* of the Society of Rheology (1952-56). He was also vice-president and president of the society 1969-73.

Newton biography receives award

The History of Science Society has presented the Pfizer Award to Richard S. Westfall, professor of history and philosophy of science at Indiana University. The award, given annually for a recently published work in the history of science, goes to Westfall for

Never at Rest: A Biography of Isaac Newton (see *PHYSICS TODAY*, August 1981, page 57). The biography was cited as "a book of deep and detailed scholarship that is also a masterpiece of erudition... The treatment... is profoundly historical, unfailingly rea-