Optical Society honors nine physicists

The Optical Society of America has given awards to eight physicists for their contributions to optics and electro-optics. Robert W. Ditchburn (professor emeritus of physics at the University of Reading, England) is honored with the C.E.K. Mees Medal; Joseph W. Goodman (Stanford University) receives the Max Born Award; Sven R. Hartmann (Columbia University) is presented with the R. W. Wood Prize; Robert W. Hellwarth (University of Southern California) is honored with the Charles Hard Townes Award; Robert E. Hopkins (professor emeritus of the Institute of Optics at the University of Rochester) receives the Joseph Fraunhofer Award; William C. Martin (National Bureau of Standards) is recognized with the William F. Meggers Award; Harold Osterberg (retired from the American Optical Co.) receives the David Richardson Medal; Boris P. Stoicheff (University of Toronto) is honored with the Frederick Ives Medal. In addition, at the annual meeting in October, Nobel laureate Arthur L. Schawlow (Stanford) was installed as an honorary member of the Society.

The C.E.K. Mees Medal, established in 1961 by the Society and awarded biennially, recognizes research in optics that transcends disciplinary and national boundaries. Robert W. Ditchburn was cited "for his lengthy career in many disciplines of optics and for his enrichment of optical knowledge."

DITCHBURN

GOODMAN

Ditchburn's work has contributed to our understanding of ultraviolet spectroscopy, vision and solid-state physics. He and his colleagues developed techniques for vacuum ultraviolet absorption spectroscopy and for detailed experiments on photoionization in many elements and in some molecules. They used these techniques to measure optical properties of solids as well. Observations made by Navy personnel during the war led Ditchburn and his coworkers to investigate the effect of small eye movement on visual perception. They devised an optical system that allowed the movement of the eye to control movements of a target, so that its image remained fixed on the retina despite rotation of the eye or translation of the head. By carefully observing this stabilized retinal image, they were able to gain an increased understanding of how the eye retains images in normal vision. In normal vision, the saccadic movement of the eye shifts the boundaries between light and dark areas of the retinal image across the mosaic of receptors, the resulting fluctuations of illumination at the receptors produces on-off signals in appropriate fibers of the optic nerve.

After obtaining his MA and PhD from Cambridge, Ditchburn became a fellow at Trinity College, Dublin, and professor of natural and experimental philosophy, a position he held from 1929 to 1946. He worked in the British Admiralty from 1942–45, and was a professor of physics at the University of Reading from 1946 until his retirement in 1968. He has also served the scientific community in numerous capacities, including as vice president of the Physical Society and chairman of its publication committee, as vice president of the Institute of Physics and Physical Society, as a member of the British National Subcommittee for Optics (1948–66) and as its chairman (1961–66).

The Max Born Award is given annually for outstanding contributions to physical optics. The award is endowed by United Technologies Research Center and includes a $1000 cash prize. This year's winner, Joseph W. Goodman, is cited "for his contributions to many areas of optics, particularly to holography, synthetic aperture optics, the theory of speckle patterns and image processing."

Goodman has worked in optical information processing, Fourier optics, holography, statistical optics and communication theory. After obtaining his PhD in electrical engineering from Stanford University in 1963, Goodman remained there as a researcher and teacher, becoming a full professor in 1972. Since 1981 he has been director of the Information Systems Lab. He is a former director of the Optical Society

HARTMANN

HELLWARTH

HOPKINS

MARTIN

of America (1972–74) and is editor of the Journal.

The R.W. Wood Prize is awarded to recognize an outstanding discovery, scientific achievement or invention in the field of optics. Given annually and made possible by a grant from the Xerox Corporation, the prize includes a $1000 cash award. The Society cited Sven R. Hartmann for "his work in the extension of spin echoes to the conceptually different optical regime and his development of the photon-echo technique into a useful spectroscopic tool."

In addition to the work in spin and photon echoes for which he is being honored, Hartmann has worked in magnetic resonance and relaxation and studied the interaction between light and matter. He received his PhD in physics from the University of California, Berkeley, in 1961 and continued to do research and teach there until 1968. He has been professor of physics and director of the Radiation Laboratory at Columbia University since 1968.

The Charles Hard Townes Award honors Townes, whose pioneering contribution to masers and lasers have led to the development of the field of quantum electronics. First presented in 1981 and sponsored by Bell Labs, the award includes a cash prize of $1000. In its citation of Robert W. Hellwarth, the Society commended him "for his invention of the *Q*-switched laser, co-discovery of the Raman laser and explanation of the stimulated scattering phenomena, and the theory of optical phase conjugation."

Hellwarth has worked in nonlinear optics, solid-state physics, and laser devices. He received his PhD from St. John's College, Oxford University, in 1955. He joined the staff of Hughes Research Laboratories the same year, where he has served as senior staff physicist (1967–70), as senior scientist (1968–70) and as manager of the Theoretical Studies Department (1968–70). Since 1970 he has been a professor in both the Electrical Engineering and Physics Departments at the University of Southern California. He has also found time to help organize numerous scientific conferences and to participate in the US Department of Energy Committee on Inertial Confinement Research Policy (1975–76) and the *ad hoc* committee on high-power-laser window materials of the National Materials Advisory Board of the National Academy of Sciences (1971–72).

The Joseph Fraunhofer Award is given for outstanding accomplishments in optical engineering, and is endowed by the Baird Corp. Robert E. Hopkins is cited by the OSA "for his achievements in optical engineering, including the design, development, engineering and manufacturing of many optical instruments."

Hopkins has been a leader in optical design, particularly in the development of extremely high-speed, high-resolution lenses and in incorporating aspheric surfaces in production-lens designs. He also was one of the first to use computers in lens design and developed programs for advanced lens design. After obtaining his PhD from the University of Rochester in 1945, Hopkins remained there, teaching and serving as director of the Institute for Optics (1954–64), and as senior optical systems engineer at the Laboratory for Laser Energetics (1976–82). During his long research and teaching career, Hopkins was described as having "had as much influence on the course of optical engineering as any single individual." He is also a past president of Tropel, Inc., a Rochester-based optical design and manufacturing firm.

The William F. Meggers Award is given each year to recognize outstand-

OSTERBERG

STOICHEFF

SCHAWLOW

ing work in spectroscopy and to commemorate the contributions made by Meggers to spectroscopy and meterology. William C. Martin is cited by the Society "for his outstanding contributions to the understanding of the spectra of complex atoms and ions."

An expert on atomic spectra and structure, Martin was described as "a leader in optical spectroscopy, high-resolution vacuum ultraviolet instrumentation, and the identification and correlation of atomic energy levels." Martin received his PhD in physics from Princeton University in 1956. After spending the next year at Princeton, Martin came to the National Bureau of Standards as a physicist on the research staff in 1957. He was chief of the spectroscopy section at the NBS from 1957 to 1962, and has been principal scientist there since 1962.

The David Richardson Medal, endowed by Howard Cary, is given annually for distinguished contributions to applied optics. The Society cites Harold Osterberg "for a career spanning 40 years of research in physical optics, particularly his contributions to the development of the phase microscope and his seminal contributions to integrated optics."

Osterberg has worked in thermodynamics, piezoelectricity, elasticity, instrument design, diffraction and interference phenomena, phase microscopy and interference films. He received his PhD in physics from the University of Wisconsin in 1931 and continued his work there as a research associate from 1931 to 1937. In 1937 he joined the American Optical Co., where he worked as a research physicist until his retirement in 1971.

The Frederic Ives Medal is the Society's highest award for overall distinction in optics. It is endowed by Herbert E. Ives in memory of his father's pioneering contributions to color photography, photoengraving, three-color process printing and other branches of applied optics. Boris P. Stoicheff is noted "for his contributions to high resolution Raman spectroscopy, nonlinear optics and the applications of nonlinear optics to atomic and molecular spectroscopy."

He has worked in molecular spectroscopy and structure, Rayleigh, Brillouin and Raman scattering, lasers and their applications in spectroscopy, stimulated scattering processes and two-photon absorption, elastic constants of rare-gas single crystals, and vacuum-ultraviolet laser spectroscopy. Stoicheff received his PhD from the University of Toronto in 1950. He continued his research there for one year after graduation before coming to the National Research Council of Canada, where he was a research officer in the Division of Pure Physics from 1953 to 1964. He returned to the University of Toronto in 1964, where he has served as chairman

LOOKING AT CERENKOV RADIATION WITH PMTs FROM THORN EMI

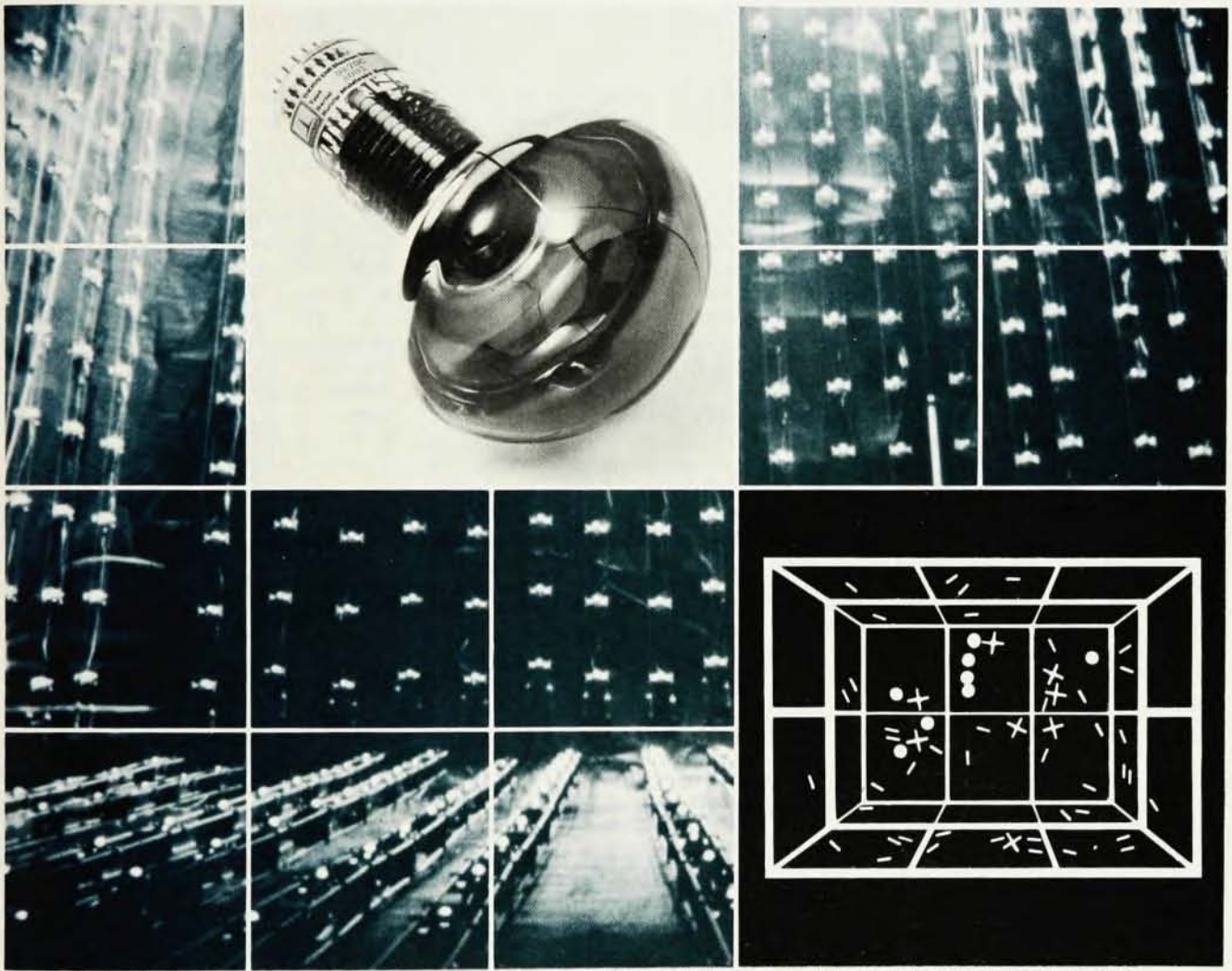

Photo courtesy of IMB Collaboration (the University of California at Irvine, University of Michigan, and Brookhaven National Laboratory) at the Morton-Thiokol salt mine in Ohio.

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of engineering science (1972–1977) and has been University Professor of Physics there since 1980. He has also been a visiting scientist at various universities including MIT (1963–64) and Stanford University (1977–78).

Arthur L. Schawlow was named as an honorary member of The Optical Society of America in October. According to the Society's by-laws, only one out of every thousand members can be recognized in this way. Schawlow is currently the seventh honorary member of OSA and the twentieth person ever to hold the honor.

Schawlow, who has done research in optical and microwave spectroscopy, nuclear quadrupole resonance, superconductivity and lasers, shared the Nobel Prize in physics in 1981 with Nicolaas Bloembergen and K. M. Siegebahn for his contributions to laser spectroscopy (PHYSICS TODAY, December 1981, page 17). He received his PhD from the University of Toronto in 1949, and worked at Columbia University and at Bell Labs before coming to Stanford University in 1961.

APS awards work in plasma physics

At the November meeting of the American Physical Society and its Division of Plasma Physics, two awards for contributions to plasma physics will be presented. Harold P. Furth of Princeton University will be given the James Clerk Maxwell Prize by the Society, and five physicists who worked on the Alcator A experiment at MIT will share the APS Plasma Physics Division award for excellence in plasma-physics research; they are Bruno Coppi, D. Bruce Montgomery and Ronald R. Parker of MIT, Leonardo Pieroni of the CNEN Laboratorio Gas Ionizzati in Frascati, and Robert J. Taylor of the University of California, Los Angeles.

The James Clerk Maxwell Prize is given annually by APS to recognize outstanding contributions to plasma physics; it includes a cash award of $3500, donated by Maxwell Labs.

Furth was cited by the Society "for his extraordinary scientific and intellectual leadership of research on toroidal magnetic confinement fusion. His outstanding technical contributions range from his pioneering investigations of resistive instabilities to his mastery of magnetic topology which has led to new configurations of confinement."

FURTH

Furth is being recognized for the application of a theory he developed describing fluid behavior of plasmas to the tokamak fusion reactor. Classical theory had assumed that plasmas had perfect conductivity; working with John Killeen of Livermore and Marshall Rosenbluth of the University of Texas, Furth determined how the finiteness of its resistivity would change the stability of the plasma. Once you cease assuming the plasma is a perfect conductor, you need to estimate its actual resistivity to determine how big an effect this has on plasma behavior. Subsequently, work with the tokamak fusion reactor at Princeton has shown that the plasmas in the tokamak are well described by this theory.

He is now working on research with the Tokamak Fusion Test Reactor. "In particular we hope to learn about the confinement of plasmas within reactor parameters. It is the first time one will have genuinely achieved the reactor-plasma regime of 100 million degrees, and good enough confinement." Their goal is not just to break even, but to achieve an ignited, self-heated plasma and to use the Tokamak Fusion Core Experiment to make a much longer-burning pulse (100 seconds or more), Furth said.

Now director of the Plasma Physics Lab and professor of astrophysical sciences at Princeton, Furth received his PhD from Harvard University in 1960. He continued his research interests at the Lawrence Radiation Lab of the University of California, Berkeley, until 1967, when he came to the Princeton Plasma Lab as co-head of the Experimental Division.

The APS Division of Plasma Physics gives its annual Award for Excellence in Plasma Research to recognize a "specific discovery or achievement" in plasma physics. This year's winners will share equally the $5000 cash prize that accompanies the award. Coppi, Montgomery, Parker, Pieroni and Taylor are cited by the Division "for basic experimental contributions to the understanding of tokamak plasma physics and the advancement of magnetic fusion research into the reactor plasma regime."

The five award winners were scientific leaders of the Alcator A team at MIT, which around 1978 succeeded in resolving a number of fundamental questions regarding the ohmic-heating regime in tokamaks. In their experiments on the Alcator A (which is able to operate at strong magnetic fields—up to 10 T), they were able:

- ▶ To show that an absolute density limit for the tokamak did not exist, but rather that the density limit depends on ohmic heating power. They thus succeeded in increasing the previous limiting value tenfold.
- ▶ To produce high-purity plasmas and use them to show that resistivity was not anomalous by demonstrating Spitzer resistivity in hydrogen over a wide parameter range.
- ▶ To clarify the scaling of confinement time with density, showing that τ_{Ee} is proportional to density when one takes into account its dependence on such factors as field strength and temperature.
- ▶ To increase the maximum value of Lawson numbers $n\tau$ achieved in the tokamak, permitting the study of tokamak plasmas with well-equilibrated electrons and ions. This has led to observations of tokamak regimes dominated by neoclassical transport for the first time.

Wieder and Chadi win Vacuum Society prizes

In November the American Vacuum Society presents its awards for 1983. Herman H. Wieder of the University of California, San Diego, receives the Medard W. Welch Award and D. James Chadi of the Xerox Palo Alto Research Center wins the Peter Mark Award.

Each year the AVS commemorates the dedicated efforts of Medard W. Welch in founding and supporting the Society by honoring "truly outstanding theoretical or experimental research." Wieder is cited "for his contributions to growth of thin semiconductor single-crystal films, and most importantly, for research leading toward III–V MOS technology."

Wieder has influenced the development of electronics and electro-optic technology based on III–V materials. He is a leader in InP technology, showing that metal–insulator–semiconductor transistors are practical for this material; for the older GaAs technology, only metal–semiconductor devices had been practical. Working at the Naval Oceans Systems Center, Wieder's group was the first to demonstrate high-quality InP metal–semiconductor field-