

AAPT. Voss, chairman of the department of physics and astronomy at Arizona State University, was honored for the contributions he has made to "physics, physics teaching, AAPT, and the physics community."

The Excellence in Undergraduate Physics Teaching Award went to **Marvin Nelson**, head of the physics department at Green River Community College in Auburn, Washington. Nelson was cited for his "many and innovative contributions to physics and the teaching of physics."

Arthur Eisenkraft received the Award for Excellence in Pre-College Physics Teaching, which is given in recognition of outstanding contributions to precollege physics teaching that have had a national impact. Eisenkraft is a physics teacher and the science coordinator in the public school system of Bedford, New York.

IN BRIEF

In October, the Eduard Rhein Foundation, based in Hamburg, Germany, presented its 1999 Basic Research Award—together with DM 150 000 (about \$80 000)—to **Vladimir A. Kotelnikov**. A former

vice president of the Russian Academy of Sciences, Kotelnikov was cited "for the first theoretically exact formulation of the sampling theorem."

Pierre Villeneuve has left his position as a research scientist at MIT's Research Laboratory of Electronics to form his own Boston-based company, Clarendon Photonics, where he will be the chief technical officer and the interim chief executive officer.

In September, **Brian Schwartz** became vice president of research and sponsored programs at the Graduate School and University Center of the City University of New York. He had previously been a professor of physics at CUNY's Brooklyn College and, for the past four years, the director of centennial programs for the American Physical Society's March 1999 meeting in Atlanta.

John Kormendy, currently a professor of astronomy at the University of Hawaii at Manoa, will be moving next month to the University of Texas at Austin to assume the Curtis T. Vaughan Jr Centennial Chair in Astronomy.

with his students and coworkers.

In 1970, I had the good fortune to join his laboratory as a NATO postdoctoral fellow and to begin a close collaboration and warm friendship with Art that lasted many years. The early years of this collaboration, when we found ourselves at the heart of a revolution in laser spectroscopy, were most exhilarating. With the first highly monochromatic and widely tunable dye lasers, we explored powerful new techniques for laser spectroscopy without Doppler broadening—such as saturation spectroscopy or polarization spectroscopy—and we applied those methods to precision spectroscopy of the simple hydrogen atom, which makes possible unique confrontations between experiment and fundamental theory. These contributions to laser spectroscopy were cited when Art received the Nobel Prize in Physics in 1981. Our discussions also led to the first proposal for laser cooling of atomic gases, which we published in early 1975.

Art combined a vast range of knowledge and interests with brilliant intuition. He could see the significance of new discoveries before most others, and he had a rare gift for solving puzzling problems. With his keen interest in clever inventions and fundamental physics and with his contagious enthusiasm, he had a special ability to inspire others to attain high levels of achievement. Art gave critical encouragement to his students when he emphasized that one does not have to study everything that is known about a subject to be able to discover something new. One only has to find one thing that was not known.

As a public speaker and science writer, Art made immense contributions to the public understanding of lasers and optical science. He could explain complex ideas in the most simple and lucid terms, using his

OBITUARIES

Arthur Leonard Schawlow

Arthur Leonard Schawlow, who, with Charles H. Townes, invented the laser, succumbed to leukemia in Stanford, California, on 28 April.

Born in Mount Vernon, New York, on 5 May 1921, Art earned all his degrees, which were in physics, at the University of Toronto—a BA in 1941, an MA in 1942, and a PhD in 1949. Art's university education was interrupted by World War II, which Canada had joined in 1939. During the war, Art taught military personnel at Toronto and then spent the years 1944–45 working on a microwave project at a radar equipment factory. For his PhD, which was supervised by Malcolm Crawford, he studied the properties of nuclei by means of high-resolution spectroscopy of atomic beams.

Doctorate in hand, Art joined Townes at Columbia University as a postdoctoral fellow to work on the microwave spectroscopy of atoms and molecules. In 1951, he married Townes's younger sister, Aurelia, and accepted a position as a research physicist at Bell Telephone Laborato-

ries, in Murray Hill, New Jersey, where he turned at first to superconductivity.

During his ten years at Bell Labs, he and Townes wrote the classic monograph *Microwave Spectroscopy* (McGraw-Hill, 1955). In 1957, the two of them recognized that the principles of the maser—that is, the generation and amplification of microwaves by stimulated emission of radiation, as first demonstrated by Townes in 1954—could be extended to optical wavelengths. Art had the ingenious insight that the laser resonator could be formed by just two mirrors, like the Fabry-Pérot interferometer that he had used as a graduate student. When published in 1958, their first paper on lasers, entitled "Optical and Infrared Masers" triggered an explosion of laser research that would revolutionize many areas of science and technology.

In 1961, Art left Bell Labs to become a physics professor at Stanford University. He served as chair of the physics department from 1966 to 1970, and held the J. G. Jackson and C. J. Wood Chair of Physics from 1978 until his retirement in 1991. At Stanford, Art set out to explore the potential of lasers for spectroscopy



ARTHUR LEONARD SCHAWLOW