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Edward Purdy Ney

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sciences presented the following three awards:

▷ **Heidi B. Hammel**, a research scientist at MIT, received the 1996 Harold C. Urey Prize. She was recognized for "precision observing techniques and detailed analysis of the atmospheric structures of the outer planets" and for being "instrumental in utilizing Hubble Space Telescope observations of planets to continue monitoring the atmospheres of planets after spacecraft flybys."

▷ The 1996 Harold Masursky Meritorious Service Award went to **William Quaide**, who recently retired from NASA headquarters. Quaide worked "to promote and nurture the science programs of the Solar System Exploration Division of the NASA Office of Space Sciences" and fought "to protect and augment the programs that support planetary science research in the United States," the citation noted.

▷ **Barney J. Conrath**, who recently retired from NASA's Goddard Space Flight Center, was awarded the 1996 Gerard P. Kuiper Prize. Conrath was honored for "his leadership in infrared spectroscopy experiments on spacecraft missions, for theoretical and observational work on outer planet atmospheres, and for an overall record of substantial contribution to planetary science."

At the AAS meeting in Madison, Wisconsin, last June, **Raymond Davis**, a professor of astronomy at the University of Pennsylvania, received the George Ellery Hale Prize, given by the AAS solar physics division. Davis was recognized for his "monumental contribution to solar physics by conceiving, planning, constructing, operating, and analyzing data from an experiment to measure the solar neutrino flux."

IN BRIEF

The Russian Academy of Natural Sciences bestowed its Piotr L. Kapitsa Gold Medal last November on **James E. White**, an emeritus professor of geophysics at the Colorado School of Mines. As one of the first American geophysicists to visit Russia, beginning in 1965, White established close ties to the geophysical community there.

At its December meeting in San Francisco, the American Geophysical Union made **Fred Spilhaus** an honorary fellow, one of the few such awards it has accorded. Spilhaus, who has been AGU's executive director since 1970, was honored for "extraordinary and visionary leadership in nurturing the development and growth of the geophysical sciences, fostering international partnerships in geophysics, and working tirelessly for over a quarter of a century to ensure that the American Geophysical Union is the scientific home of choice of geophysicists."

Last August **Charles Doering** became a professor of mathematics at the University of Michigan in Ann Arbor. Until then he had been a deputy director of the Center for Nonlinear Studies at Los Alamos National Laboratory.

James Eisenstein moved to Caltech last July to assume a post as professor of physics there. Eisenstein had been a distinguished member of the technical staff at AT&T Bell Labs until his Caltech appointment became effective in January 1996.

Art Nelson, who earned his PhD in applied physics from the Colorado School of Mines last year, has joined Rocky Mountain Laboratories in Genesee, Colorado, as a physicist.

Arthur L. Schawlow has been receiving lots of recognition lately for his role in developing the laser. In October, Schawlow, who is a professor emeritus at Stanford University, received the Ronald H. Brown American Innovator Award, created last year by the US Department of Commerce to commemorate the former secretary of commerce. A month earlier, Schawlow was inducted into the National Inventors Hall of Fame in Akron, Ohio.

OBITUARIES

Edward Purdy Ney

University of Minnesota Regents' Professor Emeritus Edward Purdy Ney, who died on 9 July 1996 at his home in Minneapolis, spent his life relentlessly searching for, and speaking, the truth.

Born on 28 October 1920 and raised in Waukon, Iowa, Ney brought a skeptical, small-town, pioneering spirit to his research and made seminal discoveries in physics, astronomy and geophysics. In 1940, as an undergraduate at the University of Minnesota, he helped Alfred O. C. Nier prepare the world's first samples of pure uranium-235. After earning a BS in physics in 1942, Ney entered the University of Virginia. For his PhD, earned there in 1946 under Jesse Beams, Ney measured the self-diffusion coefficient of UF_6—an important parameter that showed that a gaseous thermal diffusion process could not be used to enrich uranium.

In 1947 the University of Minnesota invited Ney to return and help start a cosmic-ray research program. Together with Edward Lofgren, Frank Oppenheimer and Phyllis Freier, Ney pioneered the use of cloud chambers and nuclear emulsions, flown on high-altitude plastic balloons, for the study of cosmic rays. In 1948, they, with Bernard Peters and Helmut L. Bradt of the University of Rochester, discovered heavy nuclei in the cosmic radiation.

In the early 1950s, frustrated by a number of unexplained balloon failures, Ney, John R. Winckler and Charles L. Critchfield undertook a classified military project to improve the performance of high-altitude balloons and develop a system that could be used to

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photograph military installations in the USSR. Although the development of the U2 airplane eliminated the need for such a balloon system, a number of the techniques they developed continue to be used for cosmic-ray and atmospheric research. During the program, Ney and his graduate students studied aerosols, atmospheric dust, infrared radiation and the radiation balance in the atmosphere.

In the mid-1950s, Ney and Paul Kellogg proposed that synchrotron radiation from high-energy electrons could account for much of the visible radiation from the solar corona. They immediately set out on a series of memorable eclipse expeditions to measure the polarization and intensity of the coronal light. Although their measurements disproved their theory, this work led to the development of cameras and polarimeters that could be used to study dim, diffuse sources of light. Ney used these instruments to conduct the first scientific experiment in NASA's manned space flight program—a study of the zodiacal light. Flights of these instruments on balloons, Mercury and Gemini missions and two Orbiting Solar Observatories showed that the zodiacal light is highly polarized and is produced by the scattering of sunlight from dust grains. A completely unexpected result was the observation of thousands of terrestrial lightning flashes that showed that there were ten times as many flashes over the land as over the ocean.

In 1963, Ney decided to change from physics to astronomy. He went to Australia to learn astronomy from Hanbury Brown and Richard Twiss, near Narrabri, New South Wales. Upon his return to Minnesota, Ney decided to join the very few other researchers pursuing the emerging field of infrared astronomy. With good students, his own exceptional physical insight and great experimental skills, Ney soon had Minnesota on the frontier of this new research field. He led the construction of the university's O'Brien Observatory with its 30-inch infrared telescope and later helped to design the 60-inch infrared telescope for the Mount Lemmon Observing Facility in Arizona. Ney and Nick Wolf established that silicate and carbon grains, the building blocks of the terrestrial planets, form circumstellar shells around aging stars. As Ney noted at the time, in a cosmology dominated by hydrogen and helium, it was a relief to find the source of the material that forms the terrestrial planets.

After his retirement in 1990, Ney took up yet another field of research, the effect of the radioactivity from radon gas on the atmosphere. He thought that the ionization from radon might account for the difference between the oceanic and continental clouds that had been revealed by the much higher levels of lightning over land.

Ed Ney loved to challenge conventional wisdom and took great pride in finding innovative solutions to difficult theoretical and technical problems. He loved to teach, and several generations of students learned to think deeply about physics under his mentorship.

As unconventional in his dress as in his work, Ney wore red, high-top tennis shoes to many a formal function.

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Mikhail S. Ioffe

Mikhail S. Ioffe, a Russian pioneer in the international research effort to achieve controlled fusion power, passed away in Germany on 14 July 1996, at the age of 78.

M. S. Ioffe will be most remembered for his 1961 experimental demonstration that the gross plasma instability in magnetic fusion experiments can be eliminated with the proper design of the magnetic field configuration. Ioffe's work was performed in a device called a mirror machine. The confinement principle is based on the observation that a single charged particle can remain trapped indefinitely due to the adiabatic invariance of its orbital magnetic moment in a magnetic field. However, gross plasma stability is ensured only in a "magnetic well," in which the magnitude of the magnetic field increases in all directions from the central confinement region. This condition could not be fulfilled by the azimuthally symmetric mirror machines used at the time of Ioffe's pioneering investigations. Ioffe altered the magnetic mirror configuration to achieve the needed magnetic well by adding six conductors parallel to the axis of a simple mirror device, and he experimentally demonstrated that, in this configuration, plasma confinement is greatly improved.

This result was a highlight of the first Conference on Fusion Research held by the International Atomic Energy Agency in Salzburg, Austria, in September 1961. Its importance was immediately appreciated by the fusion community; at a time when many magnetic configurations were plagued by anomalously fast losses, Ioffe presented firm experimental proof that ways existed to eliminate the most dangerous channels of loss.

The magnet configuration used by Ioffe was named "Ioffe bars," a term often found in plasma physics textbooks. Subsequent to Ioffe's work, most research experiments in mirror machines were performed in magnetic well configurations. However, the most important legacy of Ioffe's experiment was the knowledge that the theory that establishes instability criteria indeed works, and that these criteria can be used in many other plasma configurations.

Ioffe was born in Samara, Russia, on 2 September 1917. He studied physics at Leningrad University and received a diploma (the equivalent of a master's degree) in 1940. He served in the Soviet army from 1941 to 1946, and then was a staff member of the Physico-Technical Institute in Leningrad. In 1948 he joined what is today the I. V. Kurchatov Institute of Atomic Energy in Moscow, where he spent the remainder of his professional life. There he was awarded his Candidate's degree (the equivalent of a PhD) in 1953 and a Doctor of Science Degree (an advanced degree indicative of scientific stature) in 1971.

In 1956, he became a leader of a small research group that demonstrated remarkable creativity, often forging paths that other larger groups followed. Some of the outstanding results he obtained, together with his research group, included ways of controlling a plasma "micro-instability" caused by anisotropy of the ion distribution function; comprehensive studies of plasma confinement in toroidal magnetic cusps that included the identification of the plasma instabilities responsible for anomalous transport in these devices; and explanations of the many subtleties in so-called magnetoelectrostatic confinement, a direct predecessor of the tandem mirror.

Although Ioffe was honored by the Soviet government for his accomplishments, his scientific career was clouded by political disfavor. In 1969, at a time when Soviet authorities highly distrusted contacts with Western scientists, he was forced to decline a prestigious American award, the Atoms for Peace Prize. For many years, he was prevented from traveling abroad. Only in 1993 did Ioffe have the opportunity to visit the US, as an honored guest at the annual meeting of the American Physical Society's division of plasma physics.

Throughout his entire life, involvement in physics issues was an essential part of Ioffe's makeup. He was an inexhaustible source of inspiration to his colleagues for new ways to tackle and solve difficult problems. He was beloved, admired, and he will be missed.

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Raymond G. Herb

Raymond G. Herb, an emeritus professor of physics at the University of Wisconsin–Madison and the founder and president of National Electrostatics Corp in Middleton, Wisconsin, died on 1 October 1996 after battling an illness—finally diagnosed as multiple myeloma—for several months.

Born on 22 January 1908 in rural Wisconsin, Herb attended the University of Wisconsin, where he earned a PhB in 1931 and a PhD in 1935, both