



KIEFFER

pectedly on 16 December 1985 at age 54.

Kieffer was born on 6 July 1931 in Dubuque, Iowa. He obtained his BS (1953) in physics from Iowa State University and his MS (1955) and PhD (1957) in physics from St. Louis University. After postdoctoral work at Argonne National Laboratory (1957-59) and a year at the Aeronautic division of Ford Motor Company (1959-60), he joined NBS in Washington, DC, in 1960.

Kieffer was one of the dozen physicists and astrophysicists who in 1962 founded the Joint Institute for Laboratory Astrophysics, a cooperative institute of NBS and the University of Colorado in Boulder. He was a fellow of JILA and a lecturer in the department of physics of the university until 1975. He then returned to NBS in Gaithersburg, Maryland, where he worked until his death.

At St. Louis, Kieffer worked on the theory of pressure broadening of spectra of linear molecules. At Argonne he turned to atomic-beam magnetic-resonance techniques to measure hyperfine structure and determine nuclear spin and dipole moments. His research at JILA focused on the measurement of anisotropies in the angular and kinetic-energy distributions of dissociation products resulting from electron-molecule collisions. This research remains the definitive work in the field.

Concurrent with his laboratory research at JILA, Kieffer created and managed the JILA Information Center. The center was established to disseminate atomic- and molecular-collision data to the astrophysics, plasma-physics and atomic-physics communities in the form of reviews, data compilations and bibliographies. Between 1962 and 1975 he developed methods for the identification, acquisition and cataloging of all data sources for low-energy electron and photon collisions with gas-phase atoms and simple molecules, and for the retrieval, storage, manipulation

and review of the numerical data. He guided the center through its automation and computerization, prepared annotated bibliographies and initiated and participated in fundamental reviews. In 1970 Kieffer received the Department of Commerce's Gold Medal, the highest award given by the department to its employees, for "exceptional contributions in the establishment of criteria for valid atomic-collision measurements."

While at the Gaithersburg laboratories (1975-85), Kieffer assisted NBS in the delivery of measurement services to technical users all over the world. His earliest responsibilities included providing calibration services to help scientists obtain measurement traceability to NBS. Later he served for three years as a project manager in the development, certification and delivery of Standard Reference Materials. One of the last projects he managed in that capacity was the certification of SRM 1960: 10-micron polystyrene spheres, which are certified as length standards in the micro domain. These spheres have been widely publicized as the first commercialized product produced by NASA aboard a space shuttle.

Lee Kieffer's life was distinguished by probity; by encouraging others to strive for integrity, accuracy and completeness, he had a lasting impact on the fields to which he contributed.

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Jerzy Mycielski

Jerzy Mycielski died at the age of 56 on 10 February 1986 in Warsaw, Poland. He was a professor of physics at the University of Warsaw, where he headed the solid-state-theory group.

Mycielski was well known internationally for his many significant contributions to the physics of semiconductors. His achievements played a key role in the creation and growth of an internationally recognized center for semiconductor physics in Warsaw. His papers on hopping conductivity in semiconductors, on the absorption of radiation in the hopping regime, on the role of plasmons in optical processes, on the screening of short-range potentials by free carriers and on the properties of semiconductors with graded energy gaps have become classics in their respective fields. The most recent scientific passion of his life was the theory of diluted magnetic (semimagnetic) semiconductors, a subject that he guided from its very beginning. The in-

tense worldwide research activity that this subject currently enjoys owes much to his intellectual leadership.

While these activities in themselves represent accomplishments of major scientific magnitude, at least equal in importance was the role that Mycielski played in the Polish scientific community by generating enthusiasm for science in others, by catalyzing interactions among scientists and by his characteristically intuitive way of explaining things. He thrived on interacting with experimenters and possessed the rare gift of making even the most difficult problems easy to understand without sacrificing their intricacies.

Mycielski's scientific interest ranged beyond solid-state physics, and in fact beyond physics itself. He made, for example, important contributions to nonlinear quantum mechanics and earned international recognition in the field of mathematical economics by successfully casting certain problems in the language of mathematical models. These encounters with economics—which he referred to as his "hobby"—resulted in the United Nations selecting him to serve as an expert on the UN Committee on Asian and Far East Economics in 1966. He was a member of many international committees and organizations, and was to play a key role—as head of the program committee—in the planning and organization of the 19th International Conference on the Physics of Semiconductors, which will be held in Warsaw in 1988.

As an extremely popular educator, a person of great depth, warmth, tact and the highest personal integrity, Mycielski represented a major moral authority at a very difficult time in his country. During the tumultuous years 1980-81 he became a leading intellectual force in the Solidarity movement in academic circles.

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Wayne Lo

Wayne Lo, a senior staff research scientist in the physics department at General Motors Research Laboratories, died accidentally on 24 December 1984 while vacationing in Florida.

Lo was born in Hupei, China, on 5 July 1937. He earned his undergraduate degree at Cheng-Kung University in Taiwan, an MS from the University of Rhode Island and his PhD in electrical engineering from Columbia University (1972); he joined General Motors in early 1973.

Lo was an internationally recognized leader in research on tunable semiconductor lasers and spectroscopy. He led



LO

the optoelectronics research group in General Motors' physics department, where he advanced the technology and application of tunable diode lasers, including the analysis of vehicle exhaust gases. In fundamental studies of lead-salt diode lasers, Lo demonstrated that laser lifetime and stability are limited by the development of excessive resistance at the electrical contacts. To prevent this, he devised a multilayer ohmic contact consisting of different metal films. This configuration extended the laser operating lifetime to more than 1000 hours and increased shelf life to an estimated 25 years. Lo also invented an ingot-nucleation crystal-growth technique and a cadmium-diffusion process—methods that resulted in lasers with output powers of over 5 mW. In addition, he devised a laser structure with a graded carrier concentration that permitted higher operating temperatures with wider frequency-tuning ranges. Most recently, he and his colleagues used molecular-beam epitaxy to grow laser structures that set new records for operating temperatures: 174 K continuous and 270 K pulsed.

The lasers developed by Lo's group are acknowledged to be the best in the world. They have been used by the National Aeronautics and Space Administration in experiments designed to sense atmospheric concentrations of gases. General Motors has used them to measure specific gases in automotive exhaust, including carbon monoxide, methane and sulfuric acid. The uniquely fast response of a diode-laser spectrometer provided the first characterization of time-dependent emissions from a computer-controlled engine. The lasers have also been used to measure oxygen in silicon wafers, to track the evolution of vapor from a fuel spray and to detect molecules adsorbed on surfaces.

Lo performed his many activities with generosity, perseverance, spirit and a personal commitment to high

quality. He gave much to his colleagues and to his profession.

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Marianus Czerny

Marianus Czerny, professor emeritus of experimental physics at the Johann Wolfgang von Goethe Universität in Frankfurt am Main, West Germany, died in Munich on 10 September 1985, shortly before his 90th birthday.

His working life belonged to the university and its Physics Institute, to which he still felt closely connected in his later days. It is hardly possible to gain a full appreciation of the breadth of his scientific activities from a short description. His investigations in 1925–27 of the far-infrared rotational spectra of the hydrogen-halogen gases, which gave the first experimental proof of the dependence of rotational quantum numbers (as predicted by quantum mechanics), were extremely difficult in those days. Still of special interest today are his infrared *Reststrahlen* measurements of the alkali halogenide crystals, which he performed in Berlin with his pupils R. Bowling Barnes and C. H. Cartwright. They found sidebands in *Reststrahlen* reflex bands that gave the first evidence for what are now called multiphonon effects. He continued these investigations later in Frankfurt, demonstrating the existence of a sharp cutoff of higher multiphonon processes in high-frequency spectral tails that can be explained by quantum theory.

Czerny's dedication to the instrumental side of experimental physics was manifested in his development of a special kind of infrared photography, called evaporography, as well as in his work with A. F. Turner and V. Plettig in 1930 on astigmatism in spectrometers. The latter resulted in the well-known "Czerny-Turner" optical arrangement. Along the same lines, his work on fast bolometers was the necessary first step in the development of the chopped-signal method of infrared photometry. The breadth of his scientific interests is illustrated by his 1949 publication in which he demonstrated that the eye's red-sensitivity limit decreases in the same manner as the body's own heat-radiation spectrum, and by a more philosophical publication of 1979 about the goals of our scientific-technical community.

Czerny took great pride in teaching young students, and even 15 years after attaining emeritus status he appeared daily at the institute, exactly on time for the practical seminar, giving advice, answering questions and fre-



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quently repairing the most delicate instruments with amazing agility.

Czerny was truly a pioneer, a scientist of the old school: meticulous, responsible, of heartfelt simplicity and great tolerance, and extremely economical with the funds entrusted to him. He carried out his work during a difficult period of German history; the war damages to the university and the laborious years of rebuilding severely limited the development of his abilities. But in spite of all the adversities, he was always able to create for his students and collaborators the academic atmosphere that is the prerequisite for thriving, creative scientific work.

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Jesse O. Betterton Jr

Jesse O. Betterton Jr, known for his work as a physical metallurgist, died at his home in Evergreen, Colorado, on 20 January 1986. He was 65 years old.

Betterton joined the war effort at the Dow Chemical Company in Midland, Michigan, in 1942, soon after receiving his BS from Lehigh. In 1947 he left Dow to pursue a doctoral degree with Sir William Hume-Rothery at Oxford University, England. He returned to the US after completing his PhD in 1950 and joined the staff of Oak Ridge National Laboratory. He was a group leader in the Oak Ridge metals and ceramics division until 1968, when he became associate professor of physics at the University of New Orleans. His work there on the ultrapurification of metals such as zirconium resulted in the purest single titanium crystal ever obtained. Betterton retired from the university in 1981. □