PATEL

cal engineering from Stanford University. He then joined the technical staff at Bell Labs.

His research interests have included work with many aspects of lasers and laser action as well as investigations of nonlinear optics, work on high-resolution spectroscopy and the development of techniques for detecting pollution in the atmosphere and stratosphere. Recently Patel has been exploring weakly absorbing condensed materials to characterize quantitatively their spectral properties using a pulsed laser and an acousto-optic detector based on a piezoelectric transducer.

obituaries

Robert S. Shankland

Robert S. Shankland, Ambrose Swasey Professor of Physics at Case Western Reserve University for more than 40 years, died 5 March 1982 at the age of 74. Following his retirement in 1976, he continued to engage in his scientific and other interests, in particular, in his contributions to the best in architectural acoustical design through his consulting activities.

Born in Willoughby, Ohio, in 1908, Shankland studied under Dayton C. Miller, at Case School of Applied Science, where he received his BS, and Arthur C. Compton at Chicago, under whom he earned his PhD. He returned to Case to become head of the physics department on Miller's death in 1940 and continued his affiliation with Case to the end of his life.

During World War II he headed the Underwater Sound Reference Laboratory at Columbia University, charged with calibration and testing of underwater sound equipment, served as chairman of the US Navy Underwater Measurements Committee, and in 1943 was a scientific representative to the United Kingdom.

SHANKLAND

His scientific career, spanning many interests, centered on architectural acoustics, nuclear and reactor physics, and the history of physics. He published extensively on acoustics and served as consultant for innumerable churches, concert and lecture halls, and other structures with large rooms. He promoted recognition of the concept that sound diffusion is as important for concert hall acoustics as are balanced reverberation and the absence of echoes. As a result of his close association with George Szell during the latter's directorship of the Cleveland Symphony, he stressed the importance of design elements in the stages of performance halls to improve the ability of members of musical ensembles to hear each other clearly and thereby to play together better. His exceptional expertise benefited not only from his own fine musical taste and Szell's knowledge and observations, but also from his extensive studies of the acoustics of performance halls from Greek theaters, through churches and cathedrals of every age, to modern concert halls.

Following World War II he was a frequent summer collaborator at the Lawrence Radiation Laboratory in Berkeley. He participated in early experiments with the first synchrocyclotron, including the first experiment to yield information on the p-wave proton–proton interaction. Later he was a consultant for many years and the first acting technical director of the materials testing reactor at Idaho Falls.

On five occasions in the mid-fifties he conducted personal scientific interviews with Albert Einstein in which Einstein provided new current and retrospective views of his work on relativity and on the origins of his ideas. Published, these became an important primary source in the history of this significant chapter in modern physics. Shankland was also author of a textbook, *Atomic and Nuclear Physics*, contributed many articles to encyclopedias and scientific journals, and served as an associate editor of both the *American Journal of Physics* and of the *Journal of Scientific Instruments*. He was also president of Associated Midwest Universities and a member of both the physical sciences division of the National Research Council and of the Governing Board of the American Institute of Physics. Always avoiding the limelight, he was an outstanding scientific statesman of his generation, particularly of the period in which the US assumed world leadership in physics.

LESLIE L. FOLDY
Case Western Reserve University

Ralph A. Goodwin

Ralph A. Goodwin professor of physics at the United States Naval Academy, Annapolis, Maryland, died 3 May 1982 at the age of 69.

Born in Chariton, Iowa, he earned an AB at Simpson College in 1935 and PhD at Iowa State University in 1939. He was an instructor in physics at North Dakota State in 1939–40 and an assistant professor at Kansas State, Fort Hays, in 1940–41.

In 1941 he joined the civilian faculty of the US Naval Academy, where he remained until his death. He was chairman of the physics department 1950–59 and 1974–78. In 1944 he was co-author of *Physics*, USNA Edition.

Through the years, Goodwin maintained an interest in experimentation, especially in optics, but his natural curiosity often led him into other fields, such as the mechanism of regulation. In the summers of 1971–73, he was a member of the staff for an NSF-sponsored *Short Course in Lecture Demonstrations for College Teachers*, held at the Naval Academy.

E. R. PINKSTON
J. R. SMITHSON
United States Naval Academy

Julius Ashkin

Julius Ashkin, professor of physics at Carnegie-Mellon University, died 4 June 1982, after a lengthy illness. As a theoretical physicist, he made significant contributions to statistical mechanics, nuclear physics, and elementary-particle physics. As an experimental particle physicist, he was a leader in two of the most crucial experi-

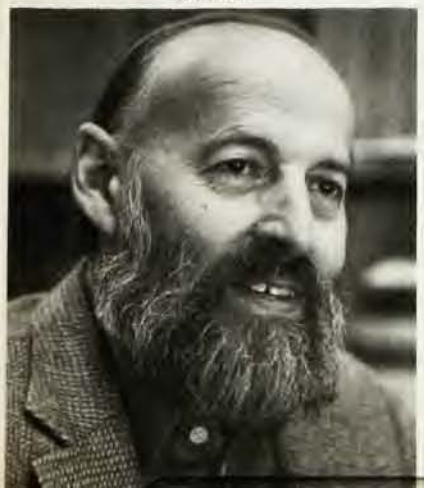
ments of the 1950s. As department chairman at Carnegie–Mellon from 1961 to 1972, he provided wisdom and leadership to a growing physics department. After giving up the chairmanship, he turned to solid-state experimental physics. Throughout his career, he was an outstanding and dedicated teacher.

Ashkin was born in Brooklyn in 1920 and received his PhD from Columbia University in 1943. Even before his PhD research was completed, Ashkin started working on the Manhattan project, first in Chicago and, from 1943 at 1946, at Los Alamos. In 1946, Robert Marshak brought him to the University of Rochester, where he served as assistant professor for four years. In 1950, he joined the faculty of Carnegie Institute of Technology (now Carnegie–Mellon University).

At Columbia, Ashkin worked with Edward Teller on an extension of the Ising model. His thesis work, carried out with Willis Lamb, concerned the propagation of order in crystal lattices. After the war, he collaborated with Hans Bethe on a major review of the theoretical and experimental knowledge of the energy loss of particles and radiation passing through matter. Published as a chapter of *Experimental Nuclear Physics*, edited by Emilio Segrè, this review served for many years as a standard reference for experimentalists in nuclear and particle physics. Ashkin with T. Y. Wu carried out one of the first detailed calculations of nucleon–nucleon scattering. Later, he pointed out that the equality of the polarization and asymmetry parameters in that scattering was not obvious (as I had stated). In a paper in 1952 we showed that this equality was a test of time-reversal invariance.

Progress in theoretical particle physics was very slow in the early 1950s, and it was clear that more experiments were needed. Therefore, Ashkin converted himself to an experimental physicist to take advantage of the newly completed Carnegie Tech synchrocyclotron in Saxonburg, Pennsylvania. He embarked on a series of very careful measurements of the scattering of positive and negative pions from hydrogen and deuterium. The results, reported in 1954, following earlier experiments by Enrico Fermi's group at Chicago, showed clearly that the scattering could be explained by a reasonance with spin $^3/_2$ and isotopic spin $^3/_2$. This was the first and the most important of the many resonances that led to the present-day quark model.

ASHKIN



In 1958, on a sabbatical, Ashkin joined a group carrying out the first experiment at the CERN synchrocyclotron. He played a key role in the discovery of the rare decay $\pi \rightarrow e\nu$, which provided an essential confirmation of the $V-A$ theory of weak interactions.

Ashkin was a superb teacher to a generation of undergraduates, graduate students and research workers. He had such an appreciation of the beauty, simplicity, and deep connectedness of physics that his enthusiasm for the subject was naturally transmitted to his students.

LINCOLN WOLFENSTEIN
Carnegie-Mellon University

Maximillian J. Herzberger

On 9 April 1982, Max Herzberger, internationally-known optical theorist and inventor of the superachromat, died in New Orleans at the age of 83.

Born in Charlottenburg, Germany, on 7 March 1899, Max received his PhD in mathematics, *magna cum laude*, from the University of Berlin in 1923, where he studied under such notables as Max Planck, E. Schmidt, Constantin Carathéodory, Albert Einstein and J. Schur (who directed his dissertation on hypercomplex numbers).

Following graduation, he set out upon a lifetime devoted to applying the ideas of the nineteenth-century mathematical physicist William Rowan Hamilton (extremals, quarternions, and so on) to optics and other branches of physics. From 1923 to 1934, while he did research on optics, particularly in lens design, for the optical firms of Emil Busch, Ernst Leitz and Carl Zeiss, he had an opportunity to examine and study many of Hamilton's unpublished works.

In 1934, however, he was forced to flee the Nazi regime with his wife, Edith, and their three young children. At the urging of Einstein, who was already at Princeton, he accepted a position at Eastman–Kodak in Rochester. There he served as head of optical research in the physics division of the research laboratories from 1935 to 1965.

In 1947, he was able to take several months leave of absence to become a member of the Institute for Advanced Study in Princeton, where his long-standing friendship with Einstein became even closer.

HERZBERGER

Upon retiring from Kodak in 1965, he joined the Eidgenössiche Technische Hochschule in Zurich, where he gave a series of lectures and directed several doctoral students in optics. Then, in 1969, he joined the faculty at the University of New Orleans as consulting professor of physics, a position he held until his second "official" retirement in 1978.

Herzberger was best known for his invention of the superachromat, a lens triplet that is color-corrected in its focus to one part in 10^6 for all wavelengths from the ultraviolet to the near infrared. (It had previously been believed that to correct effectively for n wavelengths would require n different glasses.) Recognition of the problem of color aberration in a lens system, of course, dates back to Newton. By 1942, however, Max had realized that there was a fundamental difficulty with the theoretical expression for the index of refraction of a glass, whose remedy pointed to the development of a superachromat. After further investigation, design and testing, in 1968 he obtained a patent for the superachromat, which soon found important applications in high-resolution aerial photography. To facilitate further application, in 1972 Herzberger published a listing of the 400-odd triplet combinations having practical apertures from among all possible combinations of the more than 300 commercially available optical glasses.

Some of his other achievements in optics, while less well known than the superachromat, were no less innovative. He was the first to use the algebra of Hermann Grassmann to design a microscope objective (1931). His method of diapoints (1934), involving a plane of analysis parallel rather than perpendicular to the optical axis, enables a researcher to characterize image dis-