

weight distributions, and measuring rates of photopolymerization. From 1951 to 1964, he was also a lecturer in high polymers in the University of Delaware's chemistry department and was a visiting professor of chemical engineering at MIT during the academic year 1960–61.

Fred left DuPont in 1964 to accept an appointment as professor of analytical chemistry at Rensselaer Polytechnic Institute in Troy, New York. He taught and directed research in polymer science and color science, studied chromatography, and measured the molecular structures and chemical and physical properties of polymers. Fred founded the Rensselaer Color Measurement Laboratory and directed the lab from its beginning until his retirement as professor emeritus in 1984. The laboratory was the only institution in the US that granted advanced degrees in color science and was internationally recognized as a major color-science research center. Fred established the color-science journal *Color Research and Application* in 1976. As the editor-in-chief from the journal's beginning until the end of 1986, he maintained a high level of scientific and editorial integrity. He was succeeded as editor by Rolf Kuehni in 1987, and Ellen Carter, one of Fred's graduates, in 1990.

In addition to more than 280 scientific publications on polymers, color, and related fields, Fred wrote several books on polymer science, the best known being his *Textbook of Polymer Science* (Interscience, 1962). He and Max Saltzman wrote *Principles of Color Technology* (Interscience, 1966), the only text on that subject. Fred's graduates didn't have to look far for advice on going into industrial color management. With Richard N. Kelley,



Fred Wallace Billmeyer Jr

Fred wrote a book about it: *Entering Industry: A Guide for Young Professionals* (Wiley, 1975).

Technically and administratively active in every scientific society involving color or polymer science, Fred was a natural choice as an officer or member of governing boards. A list of the honors and awards bestowed on him by national and international scientific societies and other institutions would far exceed the bounds of this brief notice. He received the highest honors.

Fred was a member of several national and international standardizing organizations. When he made a proposal or voiced a reasoned objection to one, he got undivided and respectful attention, and rarely much dissent. In the American Society for Testing and Materials, he worked tirelessly as a member of the committee on color and appearance and gave particular attention to matters of terminology. That committee instituted The Fred W. Billmeyer Jr Award for outstanding service to the committee and presented the inaugural award to him in 1999.

Fred enjoyed the lighter side of life and included cartoons in his color-technology textbook. When one of my papers concluded with 10 rules for producing material color standards, they appeared in *Color Research and Application* as commandments, in the language of the King James Bible, and Fred had them set in Old English typeface.

Beyond his prodigious legacy of scientific publications, Fred left a living legacy in his many students, particularly the cadre of young color scientists who earned master's or doctoral degrees in his laboratory. The list of those distinguished graduates reads like a *Who's Who* of modern color science. I considered it an honor and privilege to participate in the graduate program as an adjunct professor.

Fred perpetuated his living legacy by transferring much of what remained of his laboratory to the Munsell Color Science Laboratory, established in 1983 at the Rochester Institute of Technology. The lab soon came under the direction of Roy Berns, one of Fred's graduates. In March 2005, RIT established the Fred W. Billmeyer Jr Memorial Undergraduate Fellowship in Color Science to employ undergraduates as research assistants in the laboratory or support their work in other institutions.

Fred stood tall in every way.

Calvin S. McCamy
Wappingers Falls, New York

Leon Blitzer

Leon Blitzer, professor of physics emeritus at the University of Arizona, died on 18 October 2004 in Tucson of complications from a severe stroke he suffered in 1999. With his passing, the UA physics department lost its most important link to the department's past.



Leon Blitzer

Leon was born on 13 December 1915 in New York City. His association with the university began in 1936 when he entered as an undergraduate student after first attending Brooklyn College in New York City. Like many easterners, he came to Tucson for health reasons. While an undergraduate, Leon met his future wife. He earned both his BS (1938) and MS (1939) in physics. He went on to graduate school at Caltech and earned his doctorate in 1943. His dissertation, "Factors Influencing the Accuracy of Rockets," was directed by Ira S. Bowen.

After doing war-related research at Caltech until 1946, Leon returned to UA as an assistant professor of physics. There, his research mainly involved spectroscopy and celestial mechanics; his work on satellite orbits was in tune with the emerging space age. Leon spent summers in southern California, working on ballistics for the Naval Ordnance Test Station, spectroscopy at the Office of Naval Research and Stanford Research Laboratories, missile trajectories and satellite orbits at the Ramo-Wooldridge Corp (now TRW) in Redondo Beach, and at the Jet Propulsion Laboratory in Pasadena. He was quite pleased that he and his family did not have to spend the torrid summers in Tucson.

Appointed at age 33 as the UA physics department's youngest full

professor, Leon was also a leader in introducing research to the department. In 1952 he received one of the first external research grants, from the US Army Office of Ordnance Research.

During his 40 years as a faculty member, Leon exemplified the ideal university professor. He was devoted to all aspects of the job—teaching, research, and service. Everyone who knew him delighted in his consistently upbeat manner and cheerful outlook on life no matter the situation. He served as the heart and conscience of the Arizona physics department. In 1985 he researched and wrote a history of the department in connection with the university's centennial observances. He retired in 1986.

Leon's humanitarian drive extended beyond his work at UA. He was instrumental in founding the Arizona chapter of the Cystic Fibrosis Foundation, was involved in work for cerebral palsy, and was active in Congregation Anshei Israel. His influence on UA, its physics department, and the community did not end with his retirement, though. He continued as an active presence in the department. He also expanded his participation in community programs and continually cared for his many neighbors and friends. If one needed help, Leon was there.

Even during the difficult times following his stroke, which severely limited his ability to communicate, Leon never lost his essential character as a decent and caring person. He is greatly missed in the Tucson and UA communities and by his many friends and family members.

In honor of their father, Leon's children have established the Leon Blitzer Teaching Award Fund in physics and related sciences at the university.

Laurence C. McIntyre Jr

John A. Leavitt

Michael D. Scadron
University of Arizona
Tucson

Melba Newell Phillips

Physicist Melba Newell Phillips, a leading science educator who lost two jobs from New York institutions during the McCarthy era for refusing to testify against friends and colleagues before a US Senate subcommittee, died on 8 November 2004 in a nursing home in Petersburg, Indiana.

Phillips was born on 1 February 1907 in Hazleton, Indiana. She graduated from high school at age 15 and, by 1926, had already earned her bachelor's degree in mathematics from Oakland City College in Indiana. She received her master's degree in

physics in 1928 from Battle Creek College in Michigan and subsequently continued her education at the University of California, Berkeley, where she became one of the first doctoral students of J. Robert Oppenheimer. She received her PhD in 1933.

In 1935, Phillips, a postdoc at Berkeley, and Oppenheimer offered an explanation for the unexpected large capture cross section of the nucleons within the deuteron when nuclei are bombarded by deuteron beams. The explanation—polarization and dissociation of the deuteron in the nucleus field—became known as the Oppenheimer–Phillips effect, and is considered one of the classics of early nuclear physics.

Customarily, a young scientist who had produced such a prominent piece of work could have expected to receive a junior-level faculty appointment at a research institution. But jobs were scarce, more so for women than men, because of the Depression. Phillips held a series of temporary positions at Bryn Mawr College in Pennsylvania, the Institute for Advanced Study in Princeton, New Jersey, and the Connecticut College for Women.

In 1938, though, Phillips obtained a long-term faculty position at Brooklyn College. Although not a research institution, the college was known for the high quality of its students, and she made her presence felt primarily through teaching and nurturing them. Two of us (Rice and Lebowitz) are among the many students who were greatly influenced by her inspired teaching, integrity, and warm personality. Her students and colleagues remember her with great affection.

Phillips had a social conscience. In 1945, while representing the Association of New York Scientists at a meeting in Washington, DC, she, with some

Manhattan Project scientists, helped organize the founding of the Federation of American Scientists, an organization whose stated mission is to end the worldwide arms race and avoid the use of nuclear weapons. Francis Bonner, who also played a key role in forming the group, recalled that the meeting was very important “because it forged a strong bond within the entire scientific community, and we went to work on civilian control of atomic energy.”

In 1952, Phillips lost both her Brooklyn College position as an assistant professor and her part-time job, which she took in 1944 at the Columbia University Radiation Laboratory, for refusing to testify before the US Senate's internal security subcommittee charged with investigating alleged communist activities. More than 30 years later, Brooklyn College publicly apologized for firing Phillips and, in 1997, the school made further amends when its physics department held a day-long symposium in her honor and established a student scholarship in her name.

Although Phillips remained unemployed for several years, she was not inactive. She coauthored two textbooks: *Classical Electricity and Magnetism* (Addison-Wesley, 1955), with one of us (Panofsky), and *Principles of Physical Science* (Addison-Wesley, 1957), with Bonner. The collaboration between Phillips and Panofsky was carried out via the US mail, and the coauthors met in person only several years later. Their book was widely used in undergraduate and graduate physics courses. It recently was reissued, sadly a few months after Phillips's death. She also coauthored a major encyclopedia article on electricity and magnetism.

In 1957, Edward Condon at Washington University appointed Phillips associate director of the university's Academic Year Institute, a teacher-training institute. She left in 1962 to join the University of Chicago faculty, where she retired 10 years later as a professor emerita. Under her influence, Chicago greatly altered and redeveloped physical science courses for nonscience majors, a part of the undergraduate curriculum that remains.

Immediately following her retirement, Phillips became a visiting professor at SUNY Stony Brook, a position she held until 1975. She also was a visiting professor at the graduate school of the Chinese Academy of Sciences's University of Science and Technology in Beijing in 1980.

As an educator, Phillips developed and implemented training for physics teaching at all grade levels and led a movement to improve physics teacher preparation. She was the first female



Melba Newell Phillips

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