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.

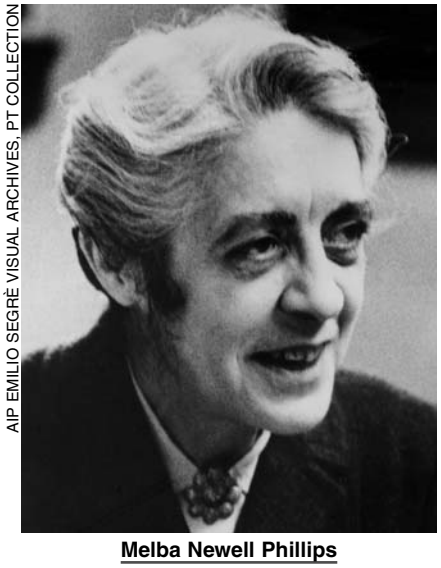
Phillips was born on 1 February 1907 in Hazleton, Indiana. She graduated from high school at age 15 and, by 1926, had already earned her bachelor's degree in mathematics from Oakland City College in Indiana. She received her master's degree in physics in 1928 from Battle Creek College in Michigan and 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."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Melba Newell Phillips

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

president of the American Association of Physics Teachers (1966–67). In 1981, AAPT gave her its inaugural Melba Newell Phillips Award.

Phillips received other honors. In 2003, the American Physical Society bestowed on her its Joseph A. Burton Forum Award. She received Vanderbilt University's Guy and Rebecca Forman Award for Outstanding Teaching in Undergraduate Physics in 1988; the American Institute of Physics's Karl Taylor Compton Medal for Leadership in Physics in 1981; and AAPT's Oersted Medal in 1974.

We have lost a good and kind friend, an outstanding scientist, a courageous woman, and a great educator in physics.

Joel Lebowitz
Rutgers, The State University of New Jersey
Piscataway
Wolfgang Panofsky
SLAC
Stanford, California
Stuart Rice
University of Chicago
Chicago, Illinois

Raja Ramanna

On 24 September 2004, with the death of Raja Ramanna following cardiac arrest in Mumbai, India, one more star disappeared from India's scientific sky. To most of the country's citizens, Ramanna was the father of India's test nuclear explosion in the Rajasthan desert on 18 May 1974. But he was much more than that. Raja, as he was known to his close friends, was a multifaceted personality—an eminent scientist, an able administrator, a gifted musician, a scholar of Sanskrit literature and philosophy, and above all a complete human being.

Born on 28 January 1925 in Tumkur, a town in southern India, Ramanna received his early education in Mysore and Bangalore. After obtaining his BSc in physics with honors from Madras Christian College in Chennai, India, he proceeded to King's College London for graduate studies in nuclear physics. In 1948 he obtained his PhD, under F. C. Champion, for work on the design and fabrication of a modified ionization chamber for studying angular distribution of ionizing particles.

The following year, Ramanna returned to India to join the Tata Institute of Fundamental Research in Bombay. As a young member of the team under Homi Jehangir Bhabha, the architect of India's nuclear program, he was a leader in organizing the physics program at the Atomic Energy Establishment, Trombay (now the Bhabha Atomic Research Centre, or BARC).

His early investigations involved neutron thermalization in several moderating assemblies as a part of the studies relating to the design and construction of India's first research reactor, Apsara. Once commissioned, Apsara made intense thermal neutron beams available for basic research, thus prompting Ramanna to initiate a program of experimental investigations of thermal neutron-induced fission of uranium-235. As a result, the Trombay fission group was created and became internationally recognized for its high-quality investigations, despite meager resources, and use of indigenously designed and fabricated equipment.

Ramanna's most important contribution to fission theory, however, is his stochastic theory of fragment mass and charge distributions in fission. The theory, which is based on the model of a random exchange of nucleons between two nascent fission fragments before scission, explains most of the observed features of fragment mass and charge distributions in low-energy fission and the features' dependence on the excitation energy of the fissioning nucleus. Direct experimental evidence for nucleon exchanges between nuclei in close proximity would come much later, though, with the advent of heavy-ion accelerators and studies of nuclear collisions at near-barrier energies.

Under Ramanna's leadership, the Trombay fission group discovered not only that shell effects vanish with excitation energy, but also what consequences that disappearance has on the production of super-heavy nuclei through heavy-ion fusion reactions. The necessity of producing cool compound nuclei as a precursor to superheavy element production is still recognized even today. Another novel

BARC, MUMBAI, INDIA

Raja Ramanna