and **Samuel E. Blum** as Inventors of the Year for 2001 for their "promotion of progress in the science and useful arts in the field of Far Ultraviolet Surgical and Dental Procedures," according to the citation. The trio discovered "that excimer laser light could etch biological tissue with no apparent damage to the tissue underlying the etched volume. Their discovery laid the foundation for techniques for changing the curvature of the human cornea." Wynne is program manager for local education outreach at IBM's T. J. Watson Research Center in Yorktown Heights, New York. Srinivasan and Blum both retired from IBM in 1990. The award was accompanied by a legislative resolution from the New York State Senate that proclaimed 12–16 February 2001 as National Inventor's Week.

The Joint Institute for Nuclear Research in Dubna, Russia, awarded its Pontecorvo Prize to **George Zatsepin** and **Vladimir Gavrin** in January for their "outstanding contributions to solar neutrino research using the gallium–germanium method at the Baksan Neutrino Observatory [affiliated with the Institute for Nuclear Research of the Russian Academy of Sciences (INR RAS) in Moscow]," according to the citation. Gavrin is head of the Gallium–Germanium Neutrino Telescope Laboratory at the observatory and head of the Laboratory for Radiochemical Methods of Detection of Neutrinos with the INR RAS. Zatsepin heads the INR RAS's department of high-energy leptons and neutrino astrophysics.

Earlier this year, the University of Cambridge awarded **Sandu Popescu** with the 2001 Adams Prize, acknowledging that his "research in quantum physics has revolutionized the field and has already resulted in the first experimental demonstration of quantum teleportation, involving a single particle of light." Popescu is a professor of physics at Bristol University in the UK and a member of Hewlett-Packard's Basic Research Institute in the Mathematical Sciences in Bristol.

OBITUARIES

William Aaron Nierenberg

William Aaron Nierenberg, an outstanding physicist, oceanographer, government adviser, and administrator, died of cancer on 10 September 2000 at his home in La Jolla, California.

Born in New York City on 13 February 1919 to Jewish immigrants from Poland, Nierenberg worked his way from poverty to renown with creativity, energy, and enthusiasm. He obtained a BS in physics from the City College of New York in 1939; his undergraduate education included a year of study at the Sorbonne in Paris (1937–38). He obtained an MA in 1942 and a PhD in 1947, both in physics, from Columbia University. His graduate research was interrupted by work on the Manhattan Project during World War II.

After a physics instructorship at Columbia University (1946–48) and a stay at the University of Michigan as an assistant professor of physics (1948–50), Nierenberg was an associate professor of physics and then a professor of physics at the University of California, Berkeley (UCB), from 1950 to 1965.

WILLIAM AARON NIERENBERG

On arrival at UCB, Nierenberg formed a group to measure spins and magnetic moments of radioactive nuclei, important parameters for understanding nuclear structure. Near the end of his career at UCB, Nierenberg had five atomic beam systems in operation on campus and at the Lawrence Berkeley National Laboratory. Short-lived radioactive nuclei were flown onto the campus by helicopter for rapid measurement. On one of his laboratory doors was the sign "Every nucleus has its moment"; on another was the following:

Lament of an Ancient Beamist

There are moments to
remember.
There are moments to forget.
There are moments to publish.
There are moments to regret.

Nierenberg was responsible for determination of many more nuclear spins and moments than any other individual. He was also an outstanding teacher in theoretical and experimental physics.

Nierenberg became familiar with naval warfare problems as project director of Columbia University's Hudson Laboratories from 1953 to 1954. There, he developed a method for sweeping for pressure mines. He also served in Paris as NATO's assistant secretary general for scientific affairs from 1960 to 1962. Both positions brought him into contact with antisubmarine warfare (ASW). In 1965, his career took a sharp turn when he accepted the directorship of the Scripps Institution of Oceanography in La Jolla, a position in which he served for 21 years. His association with oceanography did not come out of the blue, however, considering his earlier experiences with Hudson Laboratories and NATO.

Once at Scripps, Nierenberg threw himself into ocean activities with characteristic passion and imagination. Scripps became the prime contractor for the NSF deep-sea drilling program, which is one of the major scientific advances of the 20th century. It was then common belief that hydrocarbons did not exist in the deep ocean basins. In fact, they were encountered at the very first drilling site in the Gulf of Mexico.

Before Nierenberg's tenure, the emphasis at Scripps had been on seagoing exploration, but shipboard laboratory equipment had been somewhat neglected. Nierenberg immediately took steps to remedy that situation by establishing a computing facility in partnership with the Supercomputer Center in San Diego, California, and calling for the installation of shipboard computers. He also took a personal interest in the development of satellite capabilities, establishing in 1979 a remote-sensing satellite facility, the first in the US, on

the Scripps campus.

Nierenberg was rather unconventional in his approach as director. For example, he did not (as others have) support new techniques at the expense of the traditional seagoing facilities. Furthermore, he allowed beer to be served on Scripps vessels. Overall, during his tenure as director, five vessels joined the Scripps fleet.

Scripps had begun a program of measuring carbon dioxide and other greenhouse gases under Roger Revelle's directorship from 1951 to 1964. Nierenberg supported Revelle's work with enthusiasm, and intervened personally when research funds for the program were threatened. In concurrent positions as a science adviser for the President's Scientific Advisory Committee and for the White House Office of Science and Technology Policy (1969–78), he directed a study on acid rain and climate change and served on a White House panel that examined the Santa Barbara, California, oil spill of 1969.

Nierenberg did not follow conventional wisdom when it came to global warming; he vigorously said that the warming scenarios were exaggerated. He held his views so strongly that it was not easy to disagree with him. To use an analogy from ASW, Nierenberg, in exchanging information, used the principles of active rather than passive sonar, bouncing his idea off a person and observing that person's reaction.

Nierenberg, who remained closely associated with Scripps until his death, served on many governmental advisory committees; he also was a member of the JASON group. He pursued many different activities with enthusiasm and style. Among his interests were his love of France and the French language; the play *Cyrano de Bergerac* by Edmond Rostand was a favorite. Nierenberg traveled widely and was especially interested in and knowledgeable about Turkey, where he helped establish an atomic beam group at the Middle East Technical University in Ankara. Nierenberg played the balalaika, carefully tended a rose garden outside the director's office in La Jolla, and piloted his twin-engine Cessna 310.

He is missed and remembered by his many friends at UCB, at Scripps, and around the world.

CHARLES TOWNES
University of California, Berkeley
WALTER MUNK
University of California, San Diego

Frank John Kerr

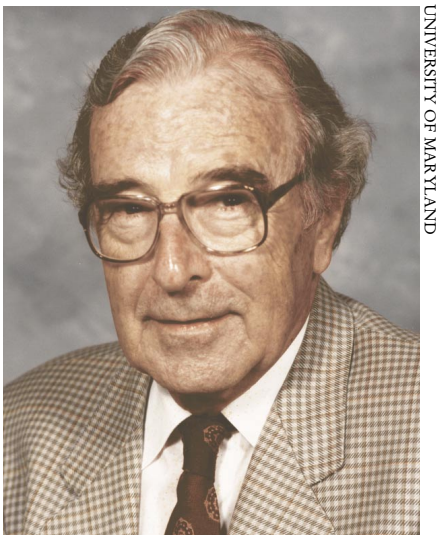
Frank John Kerr, who made major contributions to our understanding of the structure of the Milky Way, died of cancer on 15 September 2000 at his home in Silver Spring, Maryland.

Frank was born on 8 January 1918 in St. Albans, England, of Australian parents who were in England during World War I. The family returned to Australia after the war, when Frank was 1 year old. Frank received his BSc (1938) and MSc (1940) in physics at the University of Melbourne in Australia. He earned an MA in astronomy from Harvard University in 1951. He then was awarded his DSc in astronomy from Melbourne in 1962.

Frank joined the Commonwealth Scientific and Industrial Research Organization (CSIRO) radiophysics laboratory in Sydney in 1940. Of the 12 staff members at that time, he was one of the few physicists who concentrated on both theoretical and experimental fundamental science. In 1941, he put into use the "Micropup," a lightweight, air-cooled triode tube for airborne radar with 10-kW peak pulse at 450 MHz. Later, he was a key person in the use of the magnetron, and he spent the mid-1940s studying superrefraction.

Using the Radio Australia 100-kW transmitting antenna pointed at the US and a CSIRO-built receiving antenna in a shielded valley 20 miles north of Sydney, Frank obtained radio echoes of the Moon in 1948. He was the first person to conclude that serious irregularities at the top of the F2 ionospheric layer cause long-term variations in the Moon echo, and he correctly interpreted the strong short-term fluctuations as being due to lunar libration. His Moon-echo work was epoch-making. In the *Proceedings of the Institute of Radio Engineers* (volume 40, page 660, 1952), he published the classic paper on the possibility that radar echoes are reflected from the planets and the Sun. He was the first person at the radiophysics lab to specifically study astronomy, even though the group was already one of the world's leading radio astronomy organizations.

While spending a year at Harvard on a research scholarship, Frank witnessed the first detection of the 21-cm spectral line of neutral hydrogen from interstellar space. Back in Australia in late 1951, he set up the Southern Hemisphere 21-cm line program and started mapping the Magellanic Clouds. This was pioneering work—



UNIVERSITY OF MARYLAND

FRANK JOHN KERR

the first detection of a radio spectral line in an external galaxy. According to the conventional wisdom of the time, the clouds, being almost devoid of dust—especially the Small Cloud—were thought to be free of gas. Frank was undeterred by this preconception and found copious neutral hydrogen and an extended envelope around both clouds. He used a specially built 36-foot transit telescope, which at the time was the largest dish of its kind in Australia.

In 1954 and 1955, Frank, Jim Hindman, Brian Robinson, and Gérard de Vaucouleurs determined the rotation of the Magellanic Clouds and their masses—another first. Frank then started mapping the galactic disk, publishing the southern part of the disk shortly after the 1955 publication of the "Dutch map" of the Northern Hemisphere by Gart Westerhout and Maarten Schmidt. He observed that the upswing of the hydrogen layer in the northern part of the Galaxy was mirrored by a downswing in the southern part.

Frank coined the term "galactic warp" to suggest the distorting effect of the Magellanic Clouds' gravity on the shape of our galaxy. With Dutch astronomer Westerhout, Frank and Colin Gum determined the precise position of the neutral hydrogen plane. The International Astronomical Union (IAU) adopted that determination as the basis for the new galactic coordinate system. By 1960, Frank had become a leading expert in the field of galactic structure. That same year, he became a senior principal research officer at CSIRO.

Frank was heavily involved in conceptual studies for the Parkes 210-foot radio telescope and pushed for an