Art Stephenson, director of NASA's Marshall Space Flight Center, accepted the award on behalf of the team, which was recognized for "its efforts in building, placing in orbit, and operating the most sophisticated x-ray astronomical observatory ever built," according to the citation.

In Brussels, Belgium, the European Commission last November awarded the first René Descartes Prize. The prize went to three international teams, two of which work in physics-related fields. The prize "recognizes successful cross-border teamwork and European networking, which is often a determining factor of outstanding quality of science in Europe, but not normally a selection criterion in scientific prizes," says Research Commissioner Philippe Busquin. One team, made up of researchers from the Netherlands, Denmark, United Kingdom, and Germany, and led by **Dago de Leeuw**, a scientist with Philips Research Laboratories in Eindhoven, the Netherlands, was recognized for "the synthesis and application of a new family of polymeric self-oriented transistors for electronic circuits," a kind of "new disposable electronics." This team's partners together received 300 000 euros (about $266 000). The other team, which comprised researchers from England and France, was led by **Ian Smith**, Mason Professor and professor of physical chemistry at the University of Birmingham in England. This group was acknowledged "for the development and use of new methods for studying chemical reaction kinetics at very low temperature," according to the citation. "This work is proving to be of great importance for the understanding of processes taking place in the giant clouds of gas and dust that are formed in our galaxy." The partners in this team received a combined cash award of 120 000 euros.

Wendell Weart retired in October after 26 years as project manager of the Waste Isolation Pilot Plant (WIPP) Project at Sandia National Laboratories in Albuquerque, New Mexico. His retirement caps more than 41 years of continuous service at Sandia. He will continue to work as a consultant, providing scientific and programmatic advice to Sandia's nuclear waste management center. He also will remain a member of an international expert group that offers advice to GSF, the German Nuclear Industry Consortium.

At its annual meeting in Warsaw, Poland, last July, the Committee on Space Research (COSPAR) of the International Council for Science handed out the COSPAR Space Science Award—the organization's top prize—to **Roger-Maurice Bonnet**, scientific program director at the European Space Agency in Paris, and **Donald M. Hunten**, Regents Professor of Planetary Sciences at the University of Arizona at Tucson. According to the citation, Bonnet was honored for "his distinguished career as a solar physicist. He was [principal investigator] for a high-resolution [ultraviolet] spectrometer . . . and made extensive studies of chromospheric UV line profiles, obtaining new information on the propagation of waves in the chromosphere." Hunten was recognized for "his long and illustrious career in pioneering studies of the Earth's upper atmosphere and for path-breaking investigations of the atmospheres and properties of the planets and major satellites in the solar system."

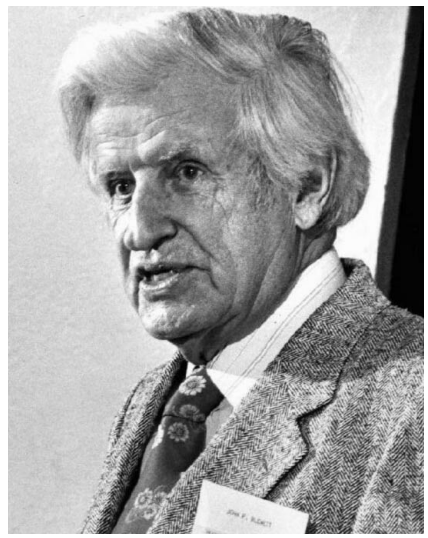
OBITUARIES

John Paul Blewett

John Paul Blewett, a key figure in the development of particle accelerators, died of acute pancreatitis in Chapel Hill, North Carolina, on 7 April 2000.

Blewett was born in Toronto on 12 April 1910. He earned his bachelor's (1932) and master's (1933) degrees in physics at the University of Toronto and his PhD in physics from Princeton University in 1936. After receiving his doctorate, he spent a year at the Cavendish Laboratory in Cambridge, England, working under Ernest Rutherford, Mark Oliphant, and others on range–energy relations for alpha particles, among other projects.

From 1937 to 1946, Blewett worked in the research laboratory of the General Electric Co in Schenectady, New York. During that period, Donald Kerst built a 20-MeV betatron at GE in 1941, and, in 1945, Ernest Charlton and William Westendorp built a record-breaking 100-MeV betatron at GE, achieving by far the highest particle energy in the world. About the same time, Blewett came across a paper by Russian physicists Dimitri Iwanenko and Isaak Ya. Pomeranchuk, in which they pointed out that high-energy electron beams circulating in a betatron would lose some energy by radiation. After performing some calculations, Blewett concluded that the radiation would indeed be significant and would make it difficult to build machines for higher energy. He predicted that the radiation would cause the orbit of the new betatron to shrink—and indeed it was found to shrink by precisely the amount Blewett had calculated. This was the first observation of what is now known as synchrotron radiation.



JOHN PAUL BLEWETT

Next, following a visit by Edwin McMillan from the Radiation Laboratory at the University of California, Berkeley, in 1945, Blewett and colleagues decided to use McMillan's new synchrotron idea to build what they hoped would be the first operating synchrotron—a 70-MeV machine—before McMillan himself could finish his 300-MeV synchrotron. Blewett and colleagues' synchrotron was finished by 1947; however, the honor of being the first to demonstrate the principle had gone to Frank Goward and D. E. Barnes in England, who had converted a small betatron to synchrotron operation. The new machine, unlike the 100-MeV betatron, had a transparent vacuum chamber, and the radiation turned out to be visible.

Blewett missed the first visual observation of the synchrotron in 1947 because he had left GE. He and Hildred Blewett, an accelerator physicist who was his wife at the time, joined the new Brookhaven National Laboratory on Long Island. Unfortunately, when they arrived at BNL, the security authorities of the US Atomic Energy Commission barred them from going to work. Apparently, a friend of Blewett's from earlier days had been arrested in Canada and charged with transmitting secret information to the USSR (a charge that was later dismissed). That association made Blewett and Hildred "security risks," and they had to cool their heels for six months before obtaining the necessary clearance to join the BNL staff.

Blewett's first major project at BNL was to participate in the design and construction of a new particle accelerator that aimed to extend the energy of available accelerated particles not just incrementally, but by a leap of an order of magnitude to 3 GeV (three billion electron volts). This proton synchrotron was called the Cosmotron because it got into the energy range of cosmic rays. Blewett took charge of the design and construction of the magnet and the radio-frequency accelerating system. He devised the structure of the Cosmotron's relatively compact C-section magnet. A major problem with the acceleration system was that, with a reasonable injection energy, the frequency would have to increase by a factor of 10 during the acceleration cycle, a range much larger than could be easily handled by devices such as mechanically-varying capacitors. Blewett decided to use ferrite—then a new material—in the accelerating cavities; this was a far more elegant and efficient solution to the modulation problem.

In 1952, the Cosmotron came into operation as the world's first billion-volt machine. A group of BNL physicists, with Blewett at the forefront, then came up with the alternating-gradient or "strong-focusing" method, which promised to make it possible for accelerators to go up at least into the 30-GeV range. Blewett saw that this technique would also solve a serious dilemma in the design of proton linear accelerators, in which the acceleration process was inherently defocusing, and focusing had previously been achieved only by the inelegant method of having grids intrude into the aperture, inevitably killing a large part of the beam while it was being accelerated. Replacing the grids with quadrupoles was a huge improvement.

When the new European high-energy physics laboratory, CERN, was proposed in 1952, a group of physicists from several European countries visited BNL and inquired about the possibility of building a machine like the Cosmotron, only a bit bigger. Learning of the ideas that had just come up at BNL, the European physicists decided to build a strong-focusing synchrotron of 25–30 GeV in Europe. This group invited Blewett and Hildred to join them to help with the new laboratory. Because CERN was split among working groups in several European locations, pending a move to Geneva where the lab was to be established, Blewett and Hildred went to Bergen, Norway, to join in the effort to create CERN's centerpiece: the proton synchrotron. They contributed to the initial design and pushed to have everything moved to Geneva, where construction for the lab began at the end of 1953.

At BNL in early 1954, the Alternating Gradient Synchrotron was approved for construction. Ken Green was in charge and Blewett was the deputy. In 1960, a 33-GeV proton beam was attained, setting yet another world record for energy. This achievement was the impetus for a study on how far one could go toward even higher energies. Blewett and Luke Yuan joined in an intensive study of the possibilities of proton synchrotrons up to 1000 GeV. That study led to the proposal for ISABELLE, a proton collider of 200–400 GeV at BNL, which was started, then abandoned, and finally reincarnated in the form of the Relativistic Heavy Ion Collider.

In 1962, Blewett, together with Stanley Livingston of MIT, published *Particle Accelerators* (McGraw-Hill, 1962), which summarized the development in the field up to that time. In 1970, Blewett founded the journal *Particle Accelerators*, for which he was the first editor.

Blewett continued as deputy chairman of the accelerator department until 1973. He then worked as a special assistant to the director until 1978, when he retired. During his "retirement," he returned to an early interest—synchrotron radiation. He took part in initiating the proposal to build the National Synchrotron Light Source at BNL, the first machine built explicitly for the purpose of producing synchrotron radiation as a tool for studies in condensed matter physics, chemistry, biology, and engineering. He also was a consultant to the Synchrotron Radiation Research Center in Taiwan. In 1993, Blewett was awarded the Robert R. Wilson Prize by the American Physical Society.

Blewett enjoyed sailing and gardening with his second wife of 17 years, Joan Warnow-Blewett, who recently retired as the associate director of the History Center at the American Institute of Physics.

Ernest D. Courant
Brookhaven National Laboratory
Upton, New York

Toyoichi Tanaka

Toyoichi Tanaka, the Otto and Jane Morningstar Professor of Science at MIT, died on 20 May 2000 in Wellesley, Massachusetts, while playing tennis.

Toyo was born in Nagaoka, Niigata Prefecture, in northwestern Japan, on 4 January 1946. His father was a professor of applied chemistry and founder of the department of environmental technology at Saitama University in Urawa, Japan. In 1968, 1970, and 1972, respectively, Toyo received BS, MS, and DSc degrees in physics from the University of Tokyo, where his thesis adviser was Akiyoshi Wada. The title of Toyo's doctoral dissertation was "Helix–Coil Transition of Biopolymers."

In the fall term of 1971, Toyo joined the MIT physics department as a postdoctoral fellow. His initial research involved a brilliant experimental and theoretical investigation of thermally-excited fluctuations in the fiber network of synthetic polymer gels. He soon demonstrated quite conclusively that the fluctuations in the intensity of laser light scattered by the gel provide detailed and accurate information on the elastic properties of the gel fiber network and on the viscous interaction between the network and the entrapped gel liquid.

Members of the MIT physics department, realizing Toyo's exceptional abilities, brought him to the faculty as assistant professor (1975–79); he served as an associate professor from 1979 to 1982 and became a full professor in 1982. In 1997, he became the inaugural Otto and Jane Morningstar Professor of Science.

In the mid-1970s, Toyo discovered a remarkable phase transition in which synthetic (polyacrylamide) gels could swell or contract by up to 1000 times in volume. He quickly realized both the fundamental physical origin of this transition and its many potential applications. Guided by these insights, he conceived and produced gels that exhibit this radical volume expansion in response to changes in chemistry, temperature, light, or electromagnetic fields. By expanding or contracting in

TOYOICHI TANAKA

appropriate conditions, these gels can be used for toxic waste removal or as drug delivery systems. Their mechanical properties can be exploited in artificial muscles that respond to light or in shoes that automatically conform to the shape of the wearer's foot. Toyo obtained many US patents for applications of gels and founded several companies such as GelMed and GelSciences and, more recently, Smart Gels and Buyo-Buyo Inc.

In the 1970s and 1980s, Toyo also applied the method of dynamic light scattering spectroscopy to the study of biomedical phenomena. These phenomena included measurements of the diffusion of protein molecules on the rabbit and human eye lens, diffusion of sickle hemoglobin in red blood cells, and the discovery that cold cataract was the result of binary liquid phase separation in cells of the eye lens.

In the 1990s, Toyo embarked on an ambitious and visionary program of creating "smart gels" that mimic many functions of proteins. The idea was to create gels from a mixture of different monomers (playing the role of amino acids) with the sequences of the monomers designed through a process of "imprinting." The theoretical foundations of the molecular imprinting in folding polymers were also developed by Toyo and his coworkers at MIT. The imprinted gels can selectively respond to specific target molecules and carry out catalytic or other enzymatic functions. His initial results, which confirmed that imprinted gels respond much better than their random counterparts to target molecules, point the way for future research.

These discoveries brought international recognition. In 1985, Toyo was awarded the Nishina Memorial Prize, the most prestigious physics prize in Japan. Recognized for the excellence of his physics research, he received other major prizes, such as the 1986 Award of the Polymer Society of Japan, the 1994 Inoue Prize for Science, and the 1997 Toray Prize for Science and Technology. His research also affected the broader interests of society, gaining him public recognition. In 1993, he won the Vinci d'Excellence Award and, in 1996, he won both the R&D 100 Award and the first Discover Magazine's Editor's Choice Award for emerging technology.

Toyo was a versatile, brilliant lecturer and teacher of physics, highly appreciated by his students. Thanks to his remarkable artistic gifts, he brought to his lectures vivid and beautiful hand drawings and unforgettable experimental demonstrations. Senior faculty made it a special point to attend research lectures, masterpieces of elegant exposition, in which he presented his most recent discoveries.

Toyo came from a culture dedicated to scientific excellence, in which recognition was based on merit and accomplishment, but also in which modesty was regarded as a virtue. As his accomplishments and fame grew, he remained modest, showing cordiality and friendship to his colleagues and interest in and respect for his students.

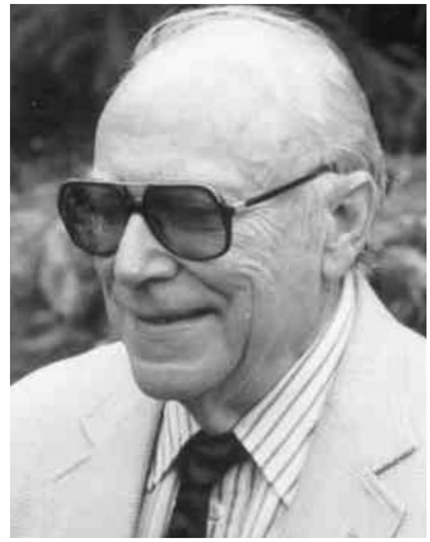
His interests were broad. He learned to speak French and Russian, and he bought a piano and learned to play it. Another interest Toyo had, which he shared with his wife Tomoko, was to form a cultural bridge between Japan and the US; Toyo served as president of the Japan Association of Greater Boston. He and his wife also were both active in the Japanese American community.

Toyo's exceptional intellect and his vivacity enriched our scientific community. The sudden passing of our beloved and admired colleague leaves us with a deep and continuing sense of loss.

GEORGE B. BENEDEK
MEHRAN KARDAR
J. DAVID LITSTER
Massachusetts Institute of Technology
Cambridge, Massachusetts

Leon Madansky

Leon Madansky, Alonzo Decker Professor Emeritus at the Johns Hopkins University, whose research interests included nuclear physics and fundamental particles, died suddenly of a heart ailment on 18 March 2000 in London, England; he collapsed after attending a play at a West End theater on the last day of a week-long vacation.



LEON MADANSKY

Madansky was born in Brooklyn, New York, on 11 January 1923. He received three degrees in physics from the University of Michigan: a BS in 1942, an MS in 1944, and a PhD in 1948. His doctoral research with Marcellus Wiedenbeck involved studies in nuclear isomerism. During his graduate education, he was an assistant in a National Defense Research Committee war project. From 1944 to 1945, he was an ensign in the US Navy, assigned to the Naval Research Laboratory to conduct research in millimeter-wave radiation.

In 1948, Madansky was appointed an instructor in the physics department of the Johns Hopkins University. He served there for the rest of his life, although he spent two sabbatical leaves (in 1969 and 1974) at CERN on Guggenheim and NSF fellowships.

Madansky was active in research in nuclear, condensed matter, and particle physics. In 1950, he and his Hopkins colleague Franco Rasetti introduced the idea of forming beams of thermal-energy positrons. Their idea revolutionized low-energy positron research in the study of solids, surface, and atomic physics, and their hypotheses about positronium formation and positron diffusion were demonstrated in the decades that followed.

In 1964, Madansky and his Hopkins colleague George Owen established the feasibility of producing negative hydrogen and deuterium ion sources, in which the metastable atoms are polarized and then ionized. This work effectively opened up opportunities for subsequent research with polarized proton beams, a subject in