ments for their appreciation.

In his last years David was busy with projects on reversible vasectomies, which, very typically, required his becoming an expert in a field new to him—in this case, the biology of the reproductive system. He also wrote articles on the search for extraterrestrial intelligence and, into his last weeks, articles on simple, demystifying approaches to general relativity giving correct values for several of the measurable phenomena in this field.

David was active in the Association of Los Alamos Scientists, the Federation of American Scientists and the National Planning Association Arms Control Committee, and he participated in several arms control conferences. He edited *Arms Reduction* (1961), which was based on the 1959 and 1960 American Academy of Arts and Sciences summer studies. More recently David founded the Scientists and Engineers Emigrant Fund, a human rights organization.

David served on the physics advisory committee of the National Science Foundation and on Brookhaven National Laboratory's high-energy advisory committee, and he headed the long-range planning committee of Fermilab.

The same eclecticism that characterized his professional life was evident in David's personality. In conversation David might illustrate a point by quoting a salient passage from the Bible, Shakespeare or S. J. Perelman, or by describing a cartoon by Saul Steinberg; his speech was often punctuated by appropriate jokes from some limitless source. His lighthearted, sane and human presence stimulated thoughts on physics, civics and other topics. His colleagues and friends miss that irreplaceable source of intelligence and energy very much; his loss leaves a hole in our lives.

VICTOR WEISSKOPF
FRANCIS LOW
LOUIS OSBORNE
Massachusetts Institute of Technology
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Arthur Herschman

Arthur Herschman, who had recently retired as head of meetings for the American Association for the Advancement of Science, died of liver and prostate cancer at his home in Alexandria, Virginia, on 29 May 1991. He was 62.

Herschman was born in Brooklyn, New York, and attended Brooklyn College, where he majored in physics, mathematics and philosophy. In 1950 he began graduate study with Gregory Breit at Yale University, working on nucleon–nucleon scattering and spontaneously emitted radiation. He received his PhD in theoretical physics in 1954, and he then became an instructor at Colby College and at the Illinois Institute of Technology. During this same period, he was a consultant for the US Army Quartermaster Corps, doing research on the use of radiation to sterilize and process food. In 1957 he joined the physics department at Worcester Polytechnic Institute, where he rose from assistant to associate professor. At Worcester he continued theoretical studies on the effects of electric and magnetic fields on biological materials and on models for enzyme synthesis, and he also served on the Commission on College Physics.

In 1961 Herschman began a new career as an assistant editor at *Physical Review*, where he developed what would be his lifelong interest in scientific communications and publishing; he later became an editor. He remained at the offices in Brookhaven until 1966, when he came to the American Institute of Physics in New York to head the newly constituted information division. AIP had just received a substantial grant from the National Science Foundation to further work on a national information system for physics, including a database (now known as SPIN), information retrieval systems, computer composition of journals and the integration of primary and secondary publications. He combined his love of physics and philosophy in the development of a comprehensive, multifaceted indexing scheme for physics and astronomy. That work resulted in the Physics and Astronomy Classification Scheme, which, with regular updates, has become an international standard.

Arthur Herschman

In 1974 Herschman joined AAAS as the head of the office of meetings and publications, in which role he supervised all aspects of the association's large annual meetings and the books, journals and reports AAAS published, until a separate publications office was created in 1990. He was a charter member of the Society for Scholarly Publishing and served on its board of directors from 1982 to 1986.

Art Herschman brought a deep sense of compassion and a generosity of spirit to his dealings with colleagues and staff. His contributions to the physics information network have been perpetuated in the SPIN database, the PACS indexing system and the research that resulted in the present-day composition system of the AIP and member-society journals and books.

RITA G. LERNER
VCH Publishers, Inc
New York, New York

James H. Wakelin

James H. Wakelin, who served three presidents as assistant secretary of the Navy for research and development, died on 21 December 1990 in Washington, DC. He was 79.

After graduating from Dartmouth College, Wakelin studied physics at Cambridge University, where he received both a bachelor's and a master's degree. He then studied at Yale University, where he received his PhD in physics in 1940. From 1939 to 1943 he was a senior physicist with B. F. Goodrich Co. During World War II he was a lieutenant commander in the Navy and helped establish the Office of Naval Research. From 1948 to 1959 he was with the Textile Research Institute in Princeton, New Jersey, serving for a few years as its director of research.

In 1959 President Eisenhower appointed Wakelin to the newly created post of assistant secretary of the Navy for R&D. He thus followed to Washington many other physicists who were named to top-level policy positions in the Federal government during the post-Sputnik period.

Wakelin's accomplishments in the Navy Department were many. Perhaps the most notable was his national leadership in the development of the field of oceanography. As chairman of the Interagency Committee on Oceanography, he promoted and guided a long-range plan among the sever-

al Federal agencies involved in oceanography and saw to it that the Navy provided leadership. For the first time the nation's oceanographers were provided with modern ships and other tools. For example Wakelin commissioned Woods Hole Oceanographic Institution's deep submersible, Alvin, which over the years has made stunning biological and geological discoveries in the deep ocean. But perhaps the most significant development of Wakelin's era was that oceanographers learned to pose problems on a truly global scale.

Within the Navy Department, Wakelin did much to consolidate and improve management of the R&D programs that previously were scattered among several departments and many laboratories. Wakelin's management style was ideal for this sensitive task, since it was his habit to approach a problem not as an outside critic but as an understanding friend. As a result he acquired the cooperation of the uniformed Navy and in time became greatly admired and respected by them. He left the Navy Department in July 1984.

Wakelin returned for two more years of government service in 1969 when President Nixon appointed him as assistant secretary of Commerce for science and technology. Once again he provided policy direction to oceanography.

Wakelin was a longtime trustee of the National Geographic Society and a devoted member of its committee on research and exploration.

ROBERT W. MORSE
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts

Frederik Jozef Belinfante

Frederik Jozef Belinfante died on 5 June 1991 in Gresham, Oregon. He was 78.

Fred was born in The Hague, The Netherlands, on 6 January 1913. He obtained his professional education at the University of Leiden, working under the direction of Hendrik A. Kramers. After receiving his doctorate in 1939, Fred became a lecturer at Leiden. However, during the German occupation from 1942 to the spring of 1945 the authorities closed the university, and the climate was impossible for original research. In 1946 Fred accepted a position as associate professor of physics at the University of British Columbia. In 1948 he became an associate professor of physics at Purdue University, and in 1951 he was promoted to professor. Fred became an emeritus professor in 1979, but his retirement from Purdue did not mean a retirement from physics: He continued an active research program in quantum field theory until the time of his death.

Fred was concerned with fundamental questions in all branches of physics, including the foundations of quantum mechanics, quantum electrodynamics, general relativity and statistical physics. He was never content with the standard points of view and enjoyed approaching fundamental questions from first principles.

In guiding his graduate students through their thesis research, Fred always showed an intense personal interest in their progress. Many times he would leave in a student's mailbox in the late afternoon a written question that required several hours of calculations. The next morning he would put the answer in the student's mailbox with a note saying, "Check this with your result." At least some of his students felt this was very good training for the real world of physics.

Fred wrote a definitive, widely referenced book, *A Survey of Hidden-Variable Theory*, on that much debated topic in quantum theory. He maintained a voluminous correspondence on this subject with experts such as Eugene Wigner, John Wheeler, Victor Weisskopf, Peter Bergmann and Abner Shimony.

Fred's impact as a scientist is evidenced in his theoretical work with Wolfgang Pauli on the intensities of molecular spectra and scattering; in his beautiful argument for the reduction of functions in atomic spectra; in his introduction of a single family name for both neutrons and protons; and in the algorithm by which he showed, using only the postulate of special relativity, that symmetrization of the energy–momentum tensor was necessary for obtaining the angular momentum of a field (and hence the spin of a particle).

Fred's interests beyond physics were many, ranging from photography to stamp collecting to linguistics. He was expert in Esperanto, and some of his scientific papers were written in that language. It was a joy to converse with Fred. He was always willing to discuss any scientific question that might arise, and he never had a harsh word for anyone.

ALEXANDER N. GERRITSEN
SERGIO RODRIGUEZ
ARNOLD TUBIS
Purdue University
West Lafayette, Indiana
JAMES C. SWIHART
Indiana University, Bloomington ■