

low, led to his earning a second PhD. Smyth joined the Princeton physics department as an instructor in 1924, and proceeded to pursue a lifelong academic career there, becoming chairman in 1935.

Until the 1930s research at Princeton was chiefly in atomic physics and optical spectroscopy, and Smyth's work was primarily in the study of ionization by electron impact and critical potentials, a field he surveyed in a lengthy article published in 1931 in *Reviews of Modern Physics*. By 1935 his 30 published papers established him as a leading experimentalist in that field, but his interests began to shift to nuclear physics after Sir James Chadwick's discovery of the neutron and the subsequent accelerator developments by John Cockcroft and Ernest Walton, and by Ernest O. Lawrence. Three of Smyth's last research publications, published in 1934, dealt with the mass spectrographic and optical detection of H^3 and He^3 produced by a 10-mA discharge at 75 keV in a deuterium-filled canal ray tube. During his tenure as chairman, the first and second cyclotrons at Princeton were built in 1935 and 1946 by Milton G. White and his associates.

Smyth believed firmly in the importance of integrating teaching and research, and he devoted considerable effort, before and after becoming department chairman, to reorganizing the large introductory physics course. He introduced the extensive use of lecture demonstrations, and he wrote, with Charles W. Ufford, *Matter, Motion and Electricity*, which was perhaps the first beginning text that attempted to cover the most recent physics in addition to the classical material.

In the spring of 1940 Smyth cut short a sabbatical in Berkeley and returned to Princeton to initiate and oversee wartime research programs for the National Research Council and the Office of Scientific Research and Development. Two particular projects he oversaw were related to nuclear fission, and workers in one project were not allowed to talk to those in the other. Smyth liked to point out that as the person in charge of both, he was not permitted to talk to himself. He continued to run the physics department throughout the war, coping as best as he could with a diminished teaching staff.

From 1943 to 1945 he served as a consultant to the Manhattan Project and was assistant director of the Metallurgical Laboratory at the University of Chicago. In early 1944 he had suggested the need for an official

report on the atomic bomb, arguing that if the bomb worked it would usher in a new age in international relations. In April of that year General Leslie Groves asked him to prepare such a report. The resulting book, *Atomic Energy for Military Purposes*, was essentially completed in June 1945. Considering how slow procedures usually are in such matters, it was perhaps a miracle that the book (appropriately updated) was declassified and released to the press on 12 August 1945, only three days after the destruction of Nagasaki.

In the years that followed the report's publication, Smyth vigorously pursued the reconstitution and expansion of the Princeton physics department, but in May 1949 he became a member of the Atomic Energy Commission and had to give up his chairmanship of the department, leaving behind standards of excellence and scholarship for future chairmen to emulate.

Smyth's role on the AEC is not in the domain of public knowledge. However, there is one event we are all familiar with: the "Oppenheimer hearings" in 1954, during the height of the McCarthy era. Indomitably on the side of sanity, Smyth was the only member of the commission to vote in favor of retaining J. Robert Oppenheimer's security clearance. Stating that a security system must be realistic, he declared that an objective reading of the entire record could result only in a positive conclusion as to Oppenheimer's loyalty, trustworthiness and future value to the United States.

Although he had been appointed by President Truman to an additional five-year term in 1951, Smyth resigned from the AEC in September 1954. He then began his ten years as chairman of the Princeton University research board, which oversaw the development of the plasma physics laboratory, the Princeton-University of Pennsylvania 3-GeV accelerator and the present cyclotron laboratory. He was president of The American Physical Society for 1957.

In 1961 he took on the new and very important role of US ambassador to the International Atomic Energy Agency in Vienna. His efforts and dedication contributed significantly to the development of nuclear safeguards and to the Non-Proliferation Treaty of 1970, the year in which his appointment was terminated by the Nixon Administration.

He was the chairman of the board of the Universities Research Association, which operates Fermilab, and he also served as a trustee of the

Associated Universities Inc, which operates the Brookhaven National Laboratory and the National Radio Astronomy Observatory.

Smyth's great interest in both physics and world affairs continued until his very last months. In 1985, on the occasion of the 40th anniversary of the Trinity test, he defended his involvement in the Manhattan Project but recommended that the United States initiate a bilateral reduction of nuclear weapons. With characteristic bluntness he remarked, "Let us, for heaven's sake, stop making faces at each other." On the same occasion, he said that the Strategic Defense Initiative would enlarge the arms race and would not work unless it could be made 100 percent effective.

Those who knew Henry Smyth ("Harry" to his friends) felt privileged to have his company, and he was accorded many honors during his lifetime. At a memorial service for him in Princeton, his old friend I.I. Rabi spoke: "So one thinks of a supreme moment in a person's life, when he stood out against great odds and did the right thing. That was Harry Smyth's fortune and Harry Smyth's greatness."

ROBERT H. DICKE

VAL FITCH

RUBBY SHERR

Princeton University
Princeton, New Jersey

Heinz R. Pagels

Heinz R. Pagels, the eminent theoretical physicist, author and scientific administrator, died tragically in a mountain climbing accident near Aspen, Colorado, on 23 July 1988. He was 49 years old and at the height of his career in each of his chosen fields.

Heinz was born in New York City in 1939. He attended Princeton (AB, 1960), and then Stanford, where he got a PhD in physics in 1965. His thesis work, done with his adviser Sidney Drell, involved a calculation of the anomalous magnetic moment of the electron. The two men devised an ingenious method that attempted to include a number of higher-order effects by a simple extension of the known formula to order e^4 . Soon after publishing his thesis, Heinz wrote a paper in which he applied this method to the calculation of baryon magnetic moments.

Following a postdoctoral year at the University of North Carolina, Heinz went to Rockefeller University in 1966. He spent the next 16 years as an associate professor there, working on a wide variety of topics in the theory of

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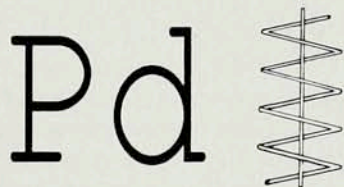


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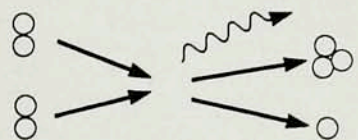
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subatomic particles. His early work was mostly on current algebra and chiral symmetry, and culminated in an influential review article, "Departures from Chiral Symmetry," published in *Physics Reports* in 1975.

In the early 1980s Heinz, along with many other particle theorists, turned his attention to cosmology. In 1982 he published two important papers in that field. One, written with David Atkatz, pioneered the study of how the Robertson-Walker universe might have originated by quantum tunneling from a previous state. The other, written with Joel Primack, was one of the first discussions of the possible role of (still undiscovered) supersymmetric particles in determining the total energy density of the universe.

Beginning in 1983, while he continued his active research in theoretical physics, Heinz extended the scope of his activities. Maintaining a position as an adjunct professor at Rockefeller University, he took on the job of executive director of the New York Academy of Sciences. In this position he demonstrated a great ability for scientific administration. He reinvigorated the academy as a whole and soon brought it into a leadership position in several areas, among them the communication of science to the public. He enthusiastically supported the academy's popular science magazine, *The Sciences*, and eventually became its publisher. In recent years *The Sciences* has won several awards, including the National Magazine Award for General Excellence. Under Heinz's leadership the academy also expanded its already active program of organizing scientific conferences, and he helped direct their focus to novel areas. For example, in 1986 the academy sponsored an influential conference on the foundations of quantum mechanics, which was attended by many prominent physicists.

In 1983 Simon & Schuster published *The Cosmic Code*, Heinz's first book on science for the general public. It included both an authoritative description of recent developments in particle physics and a thorough discussion of some of the perplexing problems involved in the interpretation of quantum mechanics. The style was informal and highly individual. The book was extremely successful, going through several hardcover and paperback printings and many foreign translations, and winning an AIP science writing award. It also influenced the thinking of several literary figures about modern science.

In 1985 Heinz's second book for the

general public, *Perfect Symmetry*, was published. It discussed the history of astronomy and some recent developments in cosmology, such as the idea of phase transitions in the early universe. Not long before his death a third book, *The Dreams of Reason*, was published. It discusses some of his most recent scientific interests, among them the emerging sciences that deal with complexity and the role that the computer plays in them.

Heinz had many interests outside physics. For example, he was president of the International League for Human Rights and a trustee of the Helsinki Watch, which monitors compliance with the Helsinki treaty. In these roles he was active in assisting Soviet scientists who emigrated to the US. He was also president of the Reality Club, a discussion group of scientists, artists and philosophers.

Like many physicists Heinz loved the mountains. Despite a childhood bout with polio, which permanently weakened his ankles, he became a skilled climber. He enjoyed the sense of adventure, and above all the sense of freedom, in climbing. If there is any consolation in the face of Heinz's death, which cut off such a fruitful career, it is that he died doing something he truly loved.

JEREMY BERNSTEIN

Stevens Institute of Technology
Hoboken, New Jersey
GERALD FEINBERG
Columbia University
New York

Georg A. Leander

Georg A. Leander, a theoretical nuclear physicist at the University Isotope Separator at Oak Ridge, died on 17 May 1988 following a lengthy fight with cancer.

Born in Norrköping, Sweden, in 1948, Leander received the degree of Higher Engineer from the Royal Institute of Technology in Stockholm in 1971. He received his PhD in 1977 from the department of mathematical physics of Lund University, Sweden, where he worked in the nuclear theory group of Sven Gosta Nilsson. Leander spent much of his early career at the Niels Bohr Institute and at NORDITA in Copenhagen, while continuing to work with the Lund group. After a short appointment as acting professor of physics at Lund, Leander accepted a position in 1981 with UNISOR. He remained at Oak Ridge until his death.

Leander was a highly productive researcher, publishing more than 100 articles in his brief career. Through-