Melvin Slein Freedman

Melvin Slein Freedman, a senior physicist at Argonne National Laboratory (ANL), died in Downers Grove, Illinois, on 18 April after a two-year struggle with cancer.

Freedman was born in Chicago on 24 May 1915. He received his bachelor's degree in 1936 and his PhD in physical chemistry in 1942—both from the University of Chicago.

Staying at Chicago, in 1943 Freedman joined the university's metallurgical laboratory as a physical chemist. The lab was then devoted largely to solving problems in the production of plutonium for the Manhattan Project. He was a founding member of the Atomic Scientists of Chicago, a group that played a major role in ensuring civilian control of nuclear weapons production and nuclear power. That group evolved into the Federation of American Scientists.

After World War II, the metallurgical lab became ANL, which Freedman joined. There, he began work on analyzing the spectrum of beta particles, which was probably his most important contribution to physics. He designed and built a beta spectrometer, which combined a high resolution of beta energies with a large acceptance angle in a unique way. With that instrument, and in collaboration with Fred Porter, Frank Wagner and others, Freedman made numerous contributions to solving problems in nuclear and atomic physics. The results from this instrument were particularly useful for working out the decay schemes and energy levels of a number of transuranic elements. It was also used in finding the K binding energy in fermium, which provided an interesting test of nuclear theory.

In 1980, Freedman turned his attention to two long-term projects, which may potentially be of great importance, but are still in limbo. He devised a scheme for detecting the solar neutrino flux for the past few million years by looking for lead-205 produced from tellurium-205 by neutrino capture. To be realized, this technique requires a thallium deposit, with minimal lead, a mile or more beneath Earth's surface. Unfortunately, such a deposit has yet to be found.

The other project is a scheme for measuring the electric dipole moment of the neutron—a popular test of time reversal. Freedman suggested that this test could be done using neutron interferometry in an interferometer in which the two paths would be distinguished by their spin rather than by their geometry. Though expensive, the experiment should be feasible.

Freedman was intelligent, witty, energetic, inventive and utterly honest. His dedication to his work was such that he was working regularly at ANL until the day he died. He will be missed.

Roy Ringo
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Thomas Andrew Potemra

Thomas Andrew Potemra, a leading researcher in the study of the electric currents that flow in space around Earth, died on 3 April 1998 in Washington, DC, of complications following heart surgery.

Born on 23 October 1938 in Cleveland, Tom graduated from Case Institute of Technology in 1960, earned a master's degree in electrical engineering from New York University in 1962 and a PhD in electrical engineering from Stanford University in 1966.

In 1965, he joined the research center of the Johns Hopkins University Applied Physics Laboratory (JHU/APL), where he remained throughout his career. He transferred from the research center to the space physics group of the JHU/APL space department in 1974 and became its supervisor in 1981.

Tom's thesis included one of the first computer simulations of ionospheric radio propagation. His early work at JHU/APL, frequently in collaboration with his friend and mentor Al Zmuda, studied VLF (very low frequency) phase shifts and riometer absorption at high latitudes. Those observations led to new ionospheric models. Tom then extended these techniques to the study of energetic electrons that precipitate into the mid-latitude ionosphere and the relationship between VLF phase shifts and atmospheric planetary-scale waves.

In 1974, when Zmuda died, Tom assumed leadership of scientific studies with the TRIAD satellite's magnetometer. Working with Takesi Iijima and a number of other researchers, he established the occurrence patterns of the auroral-zone currents (called Birkeland currents) that link the polar ionosphere to Earth's magnetosphere. This seminal work helped establish the current paradigm, long advocated by Hannes Alfvén, that underlies much of present magnetospheric research. As the principal investigator for magnetometer instruments on many subsequent spacecraft, Tom helped to develop a firm experimental foundation for current models of the ionosphere–magnetosphere system.

Thomas Andrew Potemra

Tom's contribution to space physics went far beyond his own individual research. He led the very active JHU/APL space physics group during a period in which it grew and fissioned three times to become a cluster of four groups (each of 25–60 people) dedicated to basic research, space instrumentation and scientific programming. Tom's energy, infectious enthusiasm and love of science inspired all who knew him and established an atmosphere in which basic research flourished. He was a mentor, a partner and a friend to researchers at JHU/APL and around the world.

Tom had many science-oriented avocations, but perhaps the most notable was rooted in his interest in the history of geomagnetism and auroral science and the pioneers who established these fields. He studied the journals and early published works of explorers and became—as one example—an expert on the Arctic explorer Fridtjof Nansen. He wrote articles and presented numerous public lectures on the lives of Nansen, Olaf Birkeland, Alfvén and others.

Tom was unselfishly devoted to the vitality of space science. In 1985–86, while on leave from JHU/APL, he served as a senior policy analyst in the US Office of Science and Technology Policy, where he contributed to the development of national policy in civilian space science. A member of many advisory panels and committees, he was always a voice of reason and unity, always looking toward the future. In recent years, Tom worked on developing and nurturing a new generation of NASA space science missions, such as TIMED and STEREO, which are in line with the evolving NASA emphasis on smaller, faster and more innovative programs.

Tom was wholeheartedly and deeply involved in every aspect of life—his