Rolf M. Steffen

Rolf M. Steffen, a retired professor of physics at Purdue University and an experimental physicist known for his research in nuclear and muon physics, died on 2 October 2000 in Santa Fe, New Mexico, from complications following cancer surgery.

Rolf was born on 17 June 1922 in Basel, Switzerland. He earned his bachelor's degree in physics from the Swiss Federal Institute of Technology in 1943 and his PhD in physics from the institute in 1948. He joined the Purdue faculty as an assistant professor of physics in 1949.

A leader in the development of angular correlation techniques for nuclear research, Rolf made major contributions to both theory and experiment in this field from 1950 to the mid-1970s. He used many different experimental techniques, including gamma–gamma and beta–gamma angular correlations, gamma-ray angular distributions from oriented nuclei, gamma-ray circular polarization, and beta particle transverse polarization. He studied nuclear structure, time and parity conservation, and the effect of electric and magnetic fields of atoms on nuclei.

In 1969, Rolf became the founding director of the Purdue Nuclear Accelerator Laboratory. He initiated a program using the laboratory's FN Tandem van de Graaff accelerator for in-beam gamma-ray spectroscopy following heavy-ion fusion reactions. The objective was to investigate the transition from spherical to deformed nuclei that occurs as the nucleon number is increased. Systematic studies were performed on molybdenum, technetium, ruthenium, palladium, silver, and cadmium nuclei. Previous studies had suggested that vibrations were the primary mode of excitation in those nuclei. However, the experiments showed that rotational modes of excitation were much more important than vibrational modes. In fact, the transition from spherical to deformed nuclei could be interpreted as a simple increase in deformation of a slightly deformed symmetric rotor.

Rolf wrote 22 review articles on angular correlation techniques, including major contributions to *Alpha-, Beta- and Gamma-Ray Spectroscopy* (North-Holland, 1964); *The Electromagnetic Interaction in Nuclear Physics* (North-Holland, 1975); and the 1970 Los Alamos National Laboratory (LANL) report *Angular Distributions and Correlations of Radiation Emitted from Oriented Nuclei*. His articles are considered the authoritative resources for scientists working in this area. He was often invited to share his knowledge about angular correlation techniques and taught intensive short courses in Argentina, Japan, Russia, Poland, India, and the UK. He also was a popular seminar speaker. For example, in 1973, he presented seminars in Japan, Germany, Poland, Switzerland, Denmark, the UK, and the US, two or more times in each country.

ROLF M. STEFFEN

From 1965 to 1990, Rolf served as a consultant in basic research for LANL. He did research in collaboration with LANL staff and Purdue graduate students. The collaboration used muonic atoms to study the systematics of nuclear charge radii and quadrupole and hexadecapole moments of heavy deformed nuclei. This work yielded a precise understanding of the importance of nuclear shell structure and deformation on these nuclear properties.

Rolf was a gifted and innovative experimentalist whose measurements were state-of-the-art. He supervised 17 doctoral students at Purdue and had a major impact on hundreds of others through his publications, seminars, and personal contacts. He was generous with his time and shared his vast knowledge with anyone who asked him to do so. He also was an excellent leader as a science administrator. Although he loved to do research himself, he spent much of his time enabling research colleagues and students to be successful. He often used less than his share of research funds so that his colleagues would have more to use.

Rolf shared his interests in music, art, culture, and life in general with everyone he knew. His home was like an art museum and concert hall: a joyful place, filled with delightful conversation. His many students, colleagues, and friends are very sad to lose him, but deeply grateful for all the ways he enriched their lives.

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John Edmond Walsh

John Edmond Walsh, Francis and Mildred Sears Professor of Physics at Dartmouth College and a pillar of the free electron laser (FEL) community, died on 5 December 2000 in Bradford, Vermont, of complications following surgery to repair a broken tibia.

Born in New York City on 20 August 1939, John grew up in Montauk, New York, graduating in 1962 from Nova Scotia Technical College with a BS in electrical engineering. He then joined the US Army Signal Research Laboratory at Fort Monmouth, New Jersey. His early training there, with its practical work in electrical engineering coupled with his own interest in basic science, helped to give him the unusual range of curiosity and ability discernible throughout his career.

John claimed to have come to physics by chance. His old ragtop convertible, used for commuting between Montauk and Fort Monmouth, broke down in front of the Columbia University physics department. He went in to seek help and emerged several years later with MS (1965) and ScD (1968) degrees. Although he was part of a research group in plasma physics, the degrees were in electrical engineering. His thesis, under the supervision of Perry Schlesinger and Tom Marshall, was a study of cross-magnetic field diffusion induced by nonthermal kilohertz fluctuations in a plasma. With his doctorate completed, John immediately joined Dartmouth College as an assistant professor of physics.

At Dartmouth, John continued in plasma studies and quickly became known as an outstanding teacher and research scientist. His first experiment on the scattering of electrons from electrostatic plasma fluctuations led him and his students on to extensive studies of the interactions between electron beams and plasma at higher beam currents and energies.

JOHN EDMOND WALSH

The focus of his research shifted following a 1975–76 sabbatical at Columbia University. Working again with Marshall, he took up the investigation of the stimulated Čerenkov effect. Their new idea was to use an intense relativistic electron beam in which a fast-growing beam instability would occur in a waveguide if the electromagnetic waves were slowed to the electron speed using a dielectric liner near the beam. This method resulted in exponentially developing bunching, which was the source of megawatt-level microwave and millimeter radiation.

On his return to Dartmouth, John greatly expanded on this theme using a series of FEL-type devices involving the interactions of electron beams with both dielectrics and gratings. His characteristic style of work was to use the minimum of hardware and experimental beam time to achieve useful results and to interpret the findings with outstanding physical insight. The resulting papers and conference contributions were models of clarity.

A nice example of John's imaginative approach to research was his recent (1998) production of a far-infrared source based on the Smith–Purcell effect. He used a redundant scanning electron microscope to provide an electron beam that could be passed very close to a grating. The interaction of beam and grating produces useful power in the 200–1000 μm region, where there are few alternative sources.

John's research group at Dartmouth was quite small, consisting of one permanent research associate (Robert Layman), the occasional postdoc or visiting scientist, and both graduate and undergraduate students, attracted not only by his preeminence in research but also the happy atmosphere in the laboratory. John found time for his students, even during those periods when he was head of the department (1980–84) or associate dean of the science faculty (1994–98). He was a most able administrator, helped by his abhorrence of unnecessary meetings and paperwork, which kept him from his beloved research. His legacy to the college as associate dean is a splendid extension to the Wilder Physics Laboratory and major improvements to the chemistry teaching labs. His legacy to science is about 40 doctoral students, nearly all still active in research.

For experiments at higher energies, John required electron beams not available at Dartmouth. His enthusiasm and expertise made him very welcome elsewhere: He led successful experiments at ENEA (Agency for New Technologies, Energy, and the Atmosphere) in Frascati, Italy, on Čerenkov lasers and at Oxford University and Brookhaven National Laboratory on Smith–Purcell research. Each of those projects led to significant advances in the field of FEL research. His interests extended to more applied activities, including microwave hyperthermia for cancer therapy and studies on power lines. He also held two patents on soil moisture probes, developed for the US Army Corps of Engineers, which are now used extensively in agriculture.

In recognition of the significance of his experimental research and a number of important theoretical papers, he was awarded the International Free Electron Laser Prize in 1998.

John had a great sense of humor and a fund of good stories. In his youth, he had worked on fishing boats out of Montauk; it was probably there that he acquired the happy knack of treating all people equally. Pomposity was anathema to him; as associate dean, he still drove to work in his ancient flatbed truck—flatbed because, at some stage, the sides had fallen off. A considerable athlete in his younger days, he remained an excellent skier until his untimely death. Science, his close-knit family, the Dartmouth community, and his countless friends and colleagues in many countries have suffered a grievous loss.

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