

achievements by the section had peacetime applications to air travel, highway safety and industrial technology.

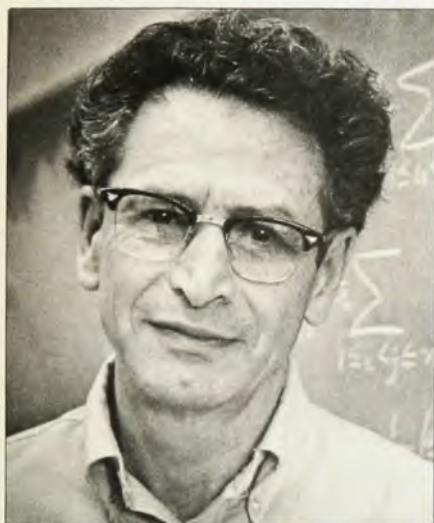
Hardy was a Fellow of the Optical Society of America. He served it as vice president (1933-35), president (1935-37) and secretary (1939-57). In 1957 he received the Society's highest award, the Frederic Ives Medal for Distinguished Work in Optics; see the *Journal of the Optical Society of America* 48, 77-85 (1958).

S. Q. DUNTLEY

Scripps Institution of Oceanography

Eugene Feenberg

Eugene Feenberg, emeritus Wayman Crow Professor of Physics at Washington University, St Louis, and member of the National Academy of Sciences, died on 7 November at the age of 71. In a distinguished career of theoretical research



FEENBERG

spanning five decades, Feenberg made fundamental contributions to nuclear theory, approximation methods and the theory of quantum fluids. He was one of the pioneers in the application methods and the theory of quantum mechanics to nuclear structure.

Feenberg was born in Fort Smith, Arkansas. After completing early studies at the University of Texas, he attended Harvard University, where he was awarded the PhD in 1933. His thesis, sponsored by E. C. Kemble, contains the first statement and proof of the optical theorem for quantum scattering. After two years as an instructor at Harvard, he held the posts of lecturer at the University of Wisconsin (1935-36) and Fellow at the Institute for Advanced Study (1936-38). It was a time of intense creative activity: Feenberg derived the E2 sum rule modified by exchange forces, contributed (with Gregory Breit and others) to the discovery of the charge independence of nuclear forces and carried out (with Eugene

Wigner and Melba Phillips) pathbreaking studies of the shell structure of light nuclei and especially the symmetries of their low levels. From 1938 to 1946 he was a member of the faculty of New York University. On leave during the war years at Sperry Gyroscope Co, he made valuable theoretical contributions to radar development. In 1946 Feenberg joined the faculty of Washington University, bringing with him the excitement of research at the forefront of the development of the modern nuclear-shell model. Later, his interest turned to approximation methods in quantum mechanics, a field that was to furnish countless delights to his incisive analytical mind. He was among the first to introduce systematic rearrangements of perturbation expansions. In the third phase of his research in St Louis, Feenberg founded a powerful approach, called the method of correlated basis functions, to the microscopic description of the ground states and low-lying excitations of quantum fluids, particularly the helium liquids. Up until the day of his death, Feenberg was generating vital new insights in this and other areas of physics, in the strikingly perceptive yet down-to-earth manner that characterized all his creative work.

Behind this remarkable career was a man who was reserved and unassuming, secure in his family and in himself and held in deep affection by his students and colleagues. His passing severs a part of everyone who came to know him well. Yet we can take comfort in the knowledge that his extraordinary contributions will live on as will the memory of his kindness and charming modesty.

JOHN W. CLARK

MICHAEL W. FRIEDLANDER

Washington University

St Louis, Missouri

EUGENE P. WIGNER

Princeton, New Jersey

Kilambi Ramavataram

Kilambi Ramavataram, a nuclear physicist on the faculty of the University of Laval in Quebec, died 30 December at age 54.

Ramavataram received his PhD in 1956 from Osmania University in India and was appointed assistant professor there upon graduation. He remained at Osmania until moving to the United States in 1961, when he joined the University of Michigan as a research associate. In 1964 he held another research position at the University of Alberta and then, in 1965, was appointed a principal scientific officer at the Rutherford High Energy Laboratory in England.

He was named to the faculty of Laval University in 1968 and remained there as an active researcher in the study of light nuclei, nuclear models and reaction theory until his death. □

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