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compose a comprehensive and definite history of the Los Alamos linear accelerator. At the same time, his manual dexterity found an outlet in the production of truly beautiful jewelry in the style of the local Indians.

He was the author or coauthor of several books on particle accelerators and their history. In 1970 he was elected to the National Academy of Sciences and in 1985 his contribution to the discovery of alternating-gradient focusing was recognized at a ceremony at Stanford at which he received an illuminated parchment signed by the directors of major high-energy laboratories throughout the world, recognizing the importance of this discovery. This was, perhaps, his most cherished honor. Posthumously he was named, together with Ernest D. Courant, for the Fermi Award (see page 83). This award, made by the President, was accepted by Livingston's wife on 18 December 1986.

During his long and productive career he made a great many friends, not only in the United States, but worldwide. They will miss him deeply.

JOHN P. BLEWETT

ERNEST D. COURANT

Brookhaven National Laboratory
Upton, New York

assistant professor of physics in 1936 and rose to the rank of professor in 1944. The Purdue physics department was then being established as a strong research department under the guidance of Karl Lark-Horovitz. James's scholarship, his creative research program and his pleasure in teaching were crucial in this enterprise. The application of statistical mechanics to the problem of rubber elasticity was his next field of interest. Here again, in collaboration with Eugene Guth, he wrote some of the classic papers in this abstract yet practical field.

During World War II James was a part of the distinguished group of scientists and engineers forming the MIT Radiation Laboratory. He made many important contributions, such as work on the propagation of radar waves at long ranges, the stabilization of radar systems and problems in systems analysis. *Theory of Servo Mechanisms* in the MIT Radiation Laboratory Series documents part of his activity during this period.

After 1945 Purdue became a major center of semiconductor research, in which he was a prominent participant. His theoretical contributions to electronic states in perturbed systems are landmarks in the field. The James-Lark-Horovitz model for localized electronic states in bombarded semiconductors provided a guide for the interpretation of radiation damage in semiconductors. His interest in chemical physics continued in studies of molecular crystals such as methane and solid hydrogen.

He succeeded Lark-Horovitz as head of the Purdue physics department in 1958 and served in that capacity until 1966, when he returned to teaching and research. This period witnessed a significant growth in the activities of the department.

After his retirement in 1974, James continued to maintain a strong research interest and served as a consultant to the Center for Information and Data Analysis and Synthesis, a research center affiliated with Purdue.

James was an outstanding scholar, a creative scientist and an influential teacher. His devotion to science and to his colleagues and students, his unfailing courtesy in his personal relationships and his subtle sense of humor—all these will be missed by those who knew him.

GUY W. LEHMAN
University of Kentucky
Lexington, Kentucky

SERGIO RODRIGUEZ

ANANT K. RAMDAS
Purdue University
Lafayette, Indiana □

Hubert Maxwell James

Hubert Maxwell James, emeritus professor of physics at Purdue University, died 23 May 1986 in Lexington, Kentucky. James had a long and distinguished career as a scientist, educator and administrator. Born in Clarksburg, West Virginia, on 10 March 1908, he received his AB from Randolph-Macon College in 1928 and his AM and PhD from Harvard University in 1930 and 1934, respectively. His formative research career coincided with the period when quantum mechanics had been firmly established and important applications to molecular structure were just beginning. It was at this point James, in collaboration with A. S. Coolidge, attacked the problem of the binding energy of the H_2 molecule. In a classic paper they used the variational technique to find the binding energy of this molecule with an accuracy sufficient to verify the validity of the then new quantum mechanics in a new context. This, together with this work on the Li_2 molecule, represented a significant advance over the earlier Heitler-London calculations and established his reputation in chemical physics.

After a two-year period as a research fellow at Harvard, James joined the faculty of Purdue University as an

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