

Lise Meitner Dies; Nuclear-Physics Pioneer

Lise Meitner, one of the pioneers of nuclear physics, was born in Austria on 7 Nov. 1878, the third of eight children of a Viennese lawyer. Being one of the first girls to enroll at the University of Vienna, she met occasional unpleasantness but was encouraged by Ludwig Boltzmann and in 1906 graduated with a PhD. She then studied with Max Planck in Berlin and later for a time became his assistant. But she also wanted to continue the work she had begun in Vienna on radioactivity and joined forces with Otto Hahn, who had studied radiochemistry with William Ramsay and Ernest Rutherford. That partnership lasted for over 30 years.

Her main interest was elucidation of radioactive transformations. With Hahn and Otto von Baeyer she developed accurate methods for the study of beta line spectra. The emission of so-called "Auger electrons" was first described and correctly interpreted by her, and in 1925 she showed that the beta lines were emitted after and not before the radioactive alpha transformation, a question much debated at the time. She also developed radioactive recoil, first recognized by Hahn, as a method for obtaining atomically thin layers of certain radioactive substances.

In one respect she backed the wrong hunch: She thought that the primary beta-rays (like alpha rays) were homogeneous and that the continuous spectrum found by James Chadwick in 1914 was caused by energy lost after emission. But when C. D. Ellis and W. A. Wooster disproved that view (by measuring the heat evolved by a beta emitter), she and Wilhelm Orthmann confirmed the Ellis-Wooster result by an absolute method. Those measurements gave Wolfgang Pauli the courage to propound the neutrino.

During the first world war she volunteered as an x-ray nurse with the Austrian army but managed to keep her work going through occasional visits to Berlin and was able, with Hahn, to publish the discovery of protoactinium in 1918. She then returned to Berlin, no longer as a "scientific guest" but as head of the radiation-

physics department. Lise Meitner was one of the first to use the cloud chamber for the study of alpha-ray straggling and soft beta-ray spectra, to measure the wavelength of a gamma ray by reflection from a crystal, and to find clear deviations (caused by pair production, as was understood later) from the Klein-Nishina formula for the scattering of hard gamma rays.

When Enrico Fermi in 1934 published his results from the bombardment of uranium with neutrons, Meitner persuaded Hahn to take up with her the study of the transuranic elements that appeared to be formed. But work in Hitler's Germany became more and more difficult. In 1938, after the annexation of Austria, she no longer felt safe from racial persecution, having lost the security her Austrian passport had given her. With the help of Dutch colleagues she escaped from Germany and found sanctuary in Sweden, where she continued work until she retired to England in 1960. So she was not in Germany when Hahn and Fritz Strassmann broke the web of error, showing that lighter elements (like barium) were formed when uranium was bombarded by neutrons. But when she heard of this development she worked out and published, with her nephew Otto R. Frisch, the physical details of the process, which was named "nuclear fission" in that paper.

All over the world she made many lifelong friends who appreciated her open mind and wide interest, and she is fondly remembered by many pupils for her warm-hearted help with personal problems. Among her friends

Wrubel Was Astronomy Professor at Indiana

Marshal H. Wrubel, astronomy professor at Indiana University, died of an apparent heart attack on 26 Oct. while hiking near Boulder, Colorado, where he was spending a sabbatical year as a Guggenheim Fellow at the Joint Institute for Laboratory Astrophysics.

Born in New York City in 1924, Wrubel was considered a child prodigy

PHOTO BY HEKA



LISE MEITNER

she could be lively and witty, but she never quite lost her shyness, indeed her humility, despite the many honors she received. The culminating honor was the award, given jointly to her and Hahn and Strassmann, of the Enrico Fermi Prize in 1966. She was in excellent health even after her retirement and continued to write, lecture and travel widely until 1965, when her strength began gradually to fail. She died on 27 Oct.

OTTO R. FRISCH
University of Cambridge

when he entered the Juilliard School of Music to study piano at age 11. In 1944 he graduated from Juilliard and received a BA in physics from City College of New York. After two years in the Army, he entered the University of Chicago and earned a PhD in astronomy in 1949.

After a postdoctoral year at Princeton, Wrubel joined the astronomy department at Indiana. He became in-