

before the Wrights' airplane, the *Kitty Hawk*. The *Aerodome* was later displayed in the Smithsonian's National Museum as the first airplane "capable of sustained free flight." Orville retaliated by exiling the *Kitty Hawk* to England for display in London's Science Museum. The feud was settled in 1942, but not until December 1948—11 months after Orville's death—was the *Kitty Hawk* installed as the National Museum's prized centerpiece.

[See also *Airplanes and Air Transport; Military, Science and Technology and the; and Smithsonian Institution.*]

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Fred Howard

WU, CHIEN-SHIUNG

(Wu Jianxiong in pinyin, 1912–1997), a prominent Chinese American physicist renowned for her many major contributions in nuclear physics and internationally celebrated as a pioneering woman scientist who advocated for equal opportunities for women in science.

Born in Shanghai, China, Wu pursued academic studies with the encouragement of her father, Wu Zhongyi, who instilled in her both a strong sense of Chinese nationalism and a belief in equality for women. In 1930, Wu enrolled in the elite National Central University in Nanjing where she studied physics, drawing inspiration from the example of the famous Marie Curie. After graduation in 1934, Wu worked as an assistant at Zhejiang University in Hangzhou and later at the Academia Sinica in Shanghai. Encouraged by Gu Jinghui, her supervisor in Shanghai who had received her PhD from the University of Michigan, Wu came to the United States to pursue graduate studies in physics in 1936.

Enrolling at the University of California, Berkeley, Wu studied under Ernest Lawrence but also worked closely with J. Robert Oppenheimer and Emilio Segrè. For her thesis she conducted experiments on two important topics in nuclear physics: beta decay, when electrons are emitted by the atomic nuclei, and nuclear fission, when the nuclei are split by neutrons. After receiving her PhD in 1940, Wu stayed for two years as a research fellow in Lawrence's lab. She married Luke Chia-Liu Yuan, a fellow Chinese American physicist, in May 1942. They then moved to the East Coast where Yuan worked on radar in Princeton, New Jersey, and Wu taught at Smith College and Princeton University before moving to Columbia University in 1944 to conduct research for the Manhattan Project.

Following the war, Wu stayed at Columbia as a research scientist instead of returning home to China, as she and her husband had originally planned. This was mainly because of the political instability in China during this period. They naturalized as U.S. citizens in 1954.

Wu's research in this period provided experimental proof for the Italian-American Enrico Fermi's theory on beta decay and brought her promotion to associate professor with tenure in 1952 at Columbia. Four years later Wu returned to beta decay when a conversation with Tsung-Dao Lee, her Chinese American colleague at Columbia, led her to design an experiment in beta decay to check the validity of a radical theory proposed by Lee and Chen Ning Yang, another Chinese American physicist then at Princeton. The theory predicted that in the case of weak nuclear interactions such as beta decay, particles would not follow the law of left-right parity as previously presumed. Working with scientists at the National Bureau of Standards in Washington, D.C., and overcoming many obstacles, Wu carried out the intricate experiment that proved Lee and Yang's theory to be right.

The breaking of parity was a turning point in modern physics but the Nobel Prize for Physics for 1957 went only to Lee and Yang, not Wu. Over the years, however, Wu received just about every other prize for a scientist, including the National Medal of Science from President Gerald Ford in 1975. The same year she was elected president of the American Physical Society, the first woman

and Asian American to hold the position. In the last years of her life she promoted scientific exchange between the United States, mainland China, and Taiwan, and inspired many young people, especially girls, to pursue a scientific career.

[*See also* Fermi, Enrico; Gender and Science; Lawrence, Ernest O.; Lee, Tsung-Dao; Manhattan Project; Nobel Prize in Biomedical Research; Nuclear Power; Nuclear Weapons; Oppenheimer, J. Robert; Physics; Research and Development (R&D); and Yang, Chen Ning.]

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Zuoyue Wang

XEROGRAPHY

See Photocopying.

X-RAY IMAGING

See Radiology.

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