

## FEATURE

Here is one more story of another Chinese American Hero, most people are not familiar with. She is Dr. Wu Chien-Shiung a nuclear scientist who was an important part of our Manhattan project and did not receive the proper credit for her contribution. This is your chance to learn about her, prepared by Dr. Anne Lee, a friend of our Historian.

# Dr. Chien-Shiung Wu (吳健雄),

## The First Lady of Nuclear Physics

Dr. Anne Lee, PhD

January 22, 2023

### INTRODUCTION

Madame Wu Chien-Shiung or Dr. Chien-Shiung Wu is known as “The First Lady of Nuclear Physics”, who conducted a radioactive experiment at near absolute temperature zero to prove the parity violation during beta decay. Dr. Wu’s experiment proved the nuclear particles are not mirror images of each other and they are opposite of each other.

Dr. Wu’s famous experiment did not get recognized and the unfairness in the 1957 Nobel Prize Award in Physics. The award was given to her male colleagues Dr. Tsung-Dao Lee and Dr. Chen-Ning Yang who come up with the Law of Conservation of Parity, but without acknowledging Dr. Chien-Shiung Wu, who proven the Law of Conservation of Parity Violation.

The 1957 Nobel Prizes selection committee should follow Alfred Nobel’s will of 1895, “that the Nobel Prizes are awarded to those who, during the preceding year, have conferred the greatest benefit to humankind”, stated by the Nobel Prize website.

Dr. Wu’s experiment has a greatest impact to nuclear physics, and this led to the development of atomic bombs during World War II. According to the New-York Historical Society Museum and Library Website, “Chien-Shiung believed that she was victim of industry-wide sexism, and she was not the first female scientist

to feel overlooked by the Nobel panel, nor was she the last”.

The unfairness did not stop Dr. Chien-Shiung Wu from her nuclear research career field. Dr. Wu continue to strive her best on every opportunity to excel her groundbreaking research and earned many world recognitions includes National Academy of Sciences Cyrus B. Comstock Award in Physics in 1964, Chi-Tsin Achievement Award in 1965, Honorary Fellow of the Royal Society of Edinburgh in 1969, the National Medal of Science in 1975, the Wolf Prize in Physics in 1978, Woman of the Year award from the St. Vincent Culture Foundation under UNESCO in 1981, Lifetime Achievement Award from Radcliffe College, Harvard University in 1982 and many more.

Dr. Wu following her own dreams and continue to work hard on her career field even when she was treated unfairly. As a result, this unfairness has overcome Dr. Wu’s encouragement to continue striving her best on everything that she does. Dr. Chien-Shiung Wu’s life story also encourages many women and girls to follow their dreams and make it possible even when unfairness occurs.

### DR. WU’S LIFE STORY

I decided to do more research about Dr. Chien-Shiung Wu’s life story. Chien-Shiung Wu was born in Taicang, Jiangsu, China in 1912 May 31st. Chien-Shiung’s father is Wu Zhong-Yi (吳

仲喬) and her mother is Fan Fu-Hua (樊復華). Fan Fu-Hua was a teacher, who valued education equality for both male and female. Wu Zhong-Yi was an engineer, who believed in gender equality, and he supported the cultural revolution led by Dr. Sun Yat-Sen (孫中山) that modernized the country of China, where Wu Zhong-Yi established the first girl school, and he encouraged many local girls to pursue their educations.

This included Chien-Shiung Wu who graduated from his father's Ming De Elementary School. Chien-Shiung Wu was admitted to National Central University (later Nanjing University) in 1929 and she earned an undergraduate degree in physics during 1934. Chien-Shiung Wu love learning about scientist Madame Marie Curie, Nobel Laureate in Physics early on during her university study.

According to Tsai-Chien Chiang (2014), "Chien-Shiung Wu was shocked at the sexism in American society when she learned that at Michigan women were not even allowed to use the front entrance and decided that she would prefer to study at the more liberal Berkeley in California". Therefore, Chien-Shiung Wu attended University of California at Berkeley, where she earned her Ph.D. in Physics during 1940. Chien-Shiung met physicist Luke Chia-Liu Yuan during her study at UC Berkely. Luke showed Chien-Shiung the Ernest O. Lawrence Radiation Laboratory and she was able to work on her innovative nuclear physics research.

Chien-Shiung and Luke got married in 1942. After the marriage both Luke and Chien-Shiung moved to the East Coast to find a job opportunity, since the start of World War II there are many anti-Asian hates and jobs were limited in California. Dr. Luke Yuan found a faculty position at Princeton University. Dr. Chien-Shiung Wu taught at Smith College and after a year later she found a faculty and research position at Princeton University. Dr. Wu was the first female faculty at the Princeton Physics Department.

Dr. Chien-Shiung Wu received an invitation to join the Manhattan Project at Columbia University as a senior scientist from 1944 to 1945 and she was also a professor at Columbia University from 1944 to 1980.

At the Manhattan Project, Dr. Chien-Shiung Wu developed the process for separating uranium metal into the U-235 and U-238 isotopes by gaseous diffusion and this is known as the process to develop an atomic bomb during World War II.

In 1957, both Dr. Tsung-Dao Lee and Dr. Chen-Ning Yang received the Nobel Prize in Physics for their theory of conservation of parity, where Dr. Chien-Shiung Wu confirmed the parity violation during beta decay by her famous Wu's experiment and her work did not get recognize by the Nobel Prize selection committee. "Yang and Lee tried to nominate Wu for a future Nobel prize and thanked her in their speeches. She was nominated at least seven times before 1966, when the Nobel committee announced they would conceal their list of nominees to avoid further public controversy", stated by Hamish Johnston (2020).

This sexism did not prevent Dr. Wu from her research career. Finally, the public officially recognize her work; Dr. Chien-Shiung Wu was awarded the Comstock Prize in Physics in 1964. Dr. Chien-Shiung Wu was elected first female president of American Physical Society in 1975. Hamish Johnston (2020) mentioned, "1988 Nobel laureate Jack Steinberger frequently called it the biggest mistake of the Nobel committee and Wu's role in the discovery was not publicly honored until 1978, when she was awarded the inaugural Wolf Prize in Physics". Dr. Chien-Shiung Wu passed away during February 16, 1997 in New York and she was buried in her homeland in China, where she was well recognized as the Chinese Madame Curie of Nuclear Physics. According to Jada Yuan (2021):

*Vincent Yuan (Dr. Wu's son), Lucy Lyon (Dr. Wu's daughter-in-law), and Jada Yuan (Dr. Wu's granddaughter) took a trip to China to honor my grandmother were something we'd*

*done before: In Nanjing, where she was an undergraduate, there's a memorial hall. Another statue of her, in bronze, stands in Shanghai. On the centennial trip, we attended the opening of a museum that showcases her academic papers as well as the slit-legged qipao dresses she wore under her white labcoats. In her hometown, we visited classrooms at the school her father founded — mainly so his daughter could get an education. The children there sang songs about her. Chinese hero worship is impressive to witness — and surreal to experience when your grandmother is the one being revered. In China, my grandmother was a rock star. Then, in early 2021, she became a kind of rock star here, too, when the U.S. Postal Service issued a commemorative Forever stamp in her honor. (You can also buy a T-shirt featuring her and other "Women of STEM" on it. Recently, she and her stamp were a clue on "Jeopardy!" — "Notable Asian Americans" for \$800.)*

Dr. Chien-Shiung Wu's life story was amazing and impressive to younger generation of women and girls majoring in Science, Technology, Engineering, and Mathematic (STEM). Dr. Wu's life story taught us to never give up even when we are treated unfairly either through sexism or racism. Dr. Wu encouraged us to work hard and continue to perform our best on everything that we do.

## CONCLUSION

Dr. Chien-Shiung Wu has made a significant contribution in the field of nuclear physics and her published book titled "Beta Decay" in 1965 is still a standard reference for universities and colleges. After learning more about Dr. Chien-Shiung Wu's life story, I was very impressed at her ability to adapt to the unfairness society and continue to perform her groundbreaking nuclear research to overcome obstacles of sexism and racism. Dr. Chien-Shiung Wu is well deserved for her world recognitions. Her life story encourages many women and girls

to overcome obstacles and continue to pursue their dreams.

Prepared by: Anne L. Lee, PhD, January 22, 2023



## SOURCES

Yuan, Jada (December 13, 2021). "Discovering Dr. Wu: The world reveres Chien-Shiung Wu as a groundbreaking nuclear physicist who made a startling find 65 years ago. But to me, she was Grandma — and I long to know more about her private universe".

Chiang, Tsai-Chien (2014). *Madame Chien-Shiung Wu: The First Lady of Physics Research*. World Scientific. ISBN 978-981-4374-84-2.

Johnston, Hamish (October 2, 2020). "Overlooked for the Nobel: Chien-Shiung Wu".

New York Historical Society Museum & Library (Women & The American Story) Website:

<https://wams.nyhistory.org/confidence-and-crises/world-war-ii/chien-shiung-wu/>

Nobel Prize Website: <https://www.nobelprize.org/>

History of Scientific Women Website:

<https://scientificwomen.net/women/wu-chien-shiung-94>

Atomic Heritage Foundation Website:

<https://ahf.nuclearmuseum.org/ahf/profile/chien-shiung-wu/>