



**Name in English:** Chih-Kung Jen  
**Name in Chinese:** 任之恭  
**Name in Pinyin:** Rèn Zhīgōng  
**Gender:** Male  
**Birth Year:** 1906-1995  
**Birth Place:** Hexi Village, Shanxi Province, China  
**Philanthropy:** Yes

## Pioneer in Microwave and Physics Research

**Profession (s):** Physicist, Professor

**Education:** B.S., Electrical Engineering, Massachusetts Institute of Technology; M.A., Radio Communication, 1929, University of Pennsylvania; Ph.D, Physics, 1931, Harvard University

**Awards:** 1981, Honored by a dinner in his honor hosted by Deng Xiaoping, leader of the People's Republic of China; member of Academia Sinica, Taiwan; Honorary professorships granted by five universities including Caltech, University of Science and Technology of China (1979), Shanghai University of Technology (1986), and Tsinghua University in China.

**Contribution (s):** Fascinated by microwaves of the electromagnetic spectrum, pioneering physicist Chih-Kung Jen made significant contributions to the study of physics and microwaves. He taught and influenced generations of scientists, with students that included Chinese American Nobel laureates C.N. Yang and T.D. Lee. He specialized in and made pioneering contributions to microwave spectroscopy, which studies the emission and absorption of electromagnetic radiation in atoms and molecules, useful in examining the inner structures of ozone and other atmospheric gases among other applications.

While still a Ph.D. student, Dr. Jen was the first to calculate the hydrogen atom's value for electron affinity, or the level of energy change when an electron in the atom is detached. This calculation would be instrumental for scientists doing work in the fields of quantum mechanics and astrophysics researching the basic building blocks of the universe. Among his other scientific contributions, Dr. Jen's research in the late 1920s provided experimental proof of the existence of the ionosphere, a heavily ionized layer in the upper part of the atmosphere that reflects radio waves enabling them to travel very long distances.

Dr. Jen returned to China in 1933 to teach at Tsinghua University. In 1937, along with his newlywed wife, he joined the "academic long march," an exodus of students and teachers from Beijing and Tianjin westwards to Kunming to escape the invading Japanese. This was an arduous distance of 1200 miles over many mountains. Dr. Jen taught university classes in primitive conditions using only the available English

textbooks for the next eight years, much to the distress of many Chinese language only students.

He returned to teaching at Harvard in 1946. In 1950 he became part of the physics team at the Applied Physics Laboratory at John Hopkins University conducting pioneering research in trapping free radicals. Free radicals are atoms, molecules, or ions with unpaired electrons. Because they are unpaired, these radicals are highly reactive and unstable. Dr. Jen helped in devising a way in trapping these reactive free radicals to study their structure and behavior. The study of free radicals has applications in combustion, plastics, atmospheric chemistry, biochemistry, and a whole range of different sciences and industries.

In 1972, Dr. Jen led the first delegation of Chinese American scientists from the U.S. to China, soon after President Nixon's visit reopened relations. Dr. Jen's groundbreaking visit opened up scientific exchanges between the two countries. Dr. Jen's visit also led to arrangements being made for the first American students to study in China since 1949, the very first being his own daughter. As a scientific goodwill ambassador, Jen helped strengthen US-China relations and also helped improve scientific education in Chinese universities disrupted by the Cultural Revolution. He frequently returned to China to give lectures and seminars, drawing upon his scientific knowledge to help create a new generation of scientific scholars in China.

**Philanthropy:** Since 1989, the annual C.K. Jen Scholarship Prize is awarded to top graduating high school students in Shanxi Province in China, where Jen hailed from, to encourage them to persevere in their scientific studies.

**Publications/Patents:**

- 1929 "Measurements of the Height of the Kennelly-Heaviside Layer"
- 1933 "The Continuous Electron Affinity Spectrum of Hydrogen"
- 1944 "An Observation on the Ionosphere During the Solar Eclipse of July 20, 1944"
- 1948 "The Zeeman Effect in Microwave Molecular Spectra"
- 1951 "Rotational Magnetic Moments in Polyatomic Molecules"
- 1958 "Electron Spin Resonance of Atomic and Molecular Free Radicals Trapped at Liquid Helium Temperature"
- 1963 "Free Radicals"
- 1974 "Energy Transport in Ruby via Microwave Optical Experiments"
- 1981 "Zeeman and Stark Effect"
- 1981 "A Physicist's View of Science and Technology in China"
- 1990 Recollections of a Chinese Physicist

**External Links:**

- [www.jhuapl.edu/techdigest/td1703/berl.pdf](http://www.jhuapl.edu/techdigest/td1703/berl.pdf)
- <http://www.nytimes.com/1995/11/24/us/chih-kung-jen-is-dead-at-89-leader-in-microwave-physics.html>