Sin-itiro Tomonaga Biography

Sin-itiro Tomonaga

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Biography

Tomonaga was born in Tokyo on March 31, 1906, the son of an eminent professor of philosophy. His family moved to Kyoto in 1913, where Tomonaga completed his elementary and high school education. He entered Kyoto Imperial University in 1926 and graduated with a bachelor's degree in atomic physics in 1929. After graduation, Tomonaga remained at Kyoto Imperial, where he worked with Hideki Yukawa on quantum mechanics. In 1932, he joined the laboratory of Yoshio Nishina at the Institute of Physical and Chemical Research in Tokyo. After a two-year visit with Werner Heisenberg's group at the University of Leipzig, Tomonaga returned to complete his doctoral work in Kyoto (1939).

Tomonaga received a share of the 1965 Nobel Prize for physics for his work on quantum electrodynamics. Paul Adrien Maurice Dirac and others had been able, in the late 1920s, to apply the principles of quantum theory to James Clerk Maxwell 's theory of electromagnetism. Over time, however, it became apparent that Dirac's formulation was inadequate to deal with certain specialized conditions, such as the motion of subatomic particles with very high energies. Existing equations gave nonsensical results, such as particles with infinite or zero mass and charge.

Tomonaga worked on this problem throughout the 1940s, during a period when Japan was fighting, losing, and then trying to recover from World War II. He had only the most primitive working conditions at his disposal and was almost completely isolated from physicists in the rest of the world. Yet, he was able to find a method for *renormalizing* Dirac's equations and resolve the boundary problems with which they had been unable to deal. His seminal paper, published in Japanese in 1943, was not available in English translation until 1948. Throughout his work, Tomonaga was unaware of similarly successful efforts developed independently by Richard Feynman and Julian Schwinger at approximately the same time.

Tomonaga was appointed professor of physics at the Tokyo University of Education in 1941. In 1956, he became president of the university and served in that capacity until 1962. He retired in 1969 and died in Tokyo on July 8, 1979.