

Burton Richter Biography

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Biography

Richter was born in Brooklyn, New York, on March 22, 1931. He developed an interest in science at an early age and attend the Massachusetts Institute of Technology for his undergraduate education. He earned his B.S. in 1952 and remained at M.I.T. for his doctoral work. His Ph.D. in 1956 was awarded for research using particle accelerators. After graduation, he continued accelerator research at Stanford University, where he became full professor in 1967.

At Stanford, Richter focused his attention on testing the theory of quantum electrodynamics at very small distances, of the order of 10^{-15} m. In order to carry out this research, he found it necessary to design and build new types of particle accelerators. In the late 1950s, therefore, his research team began to work on the first electron storage rings in which two beams of electrons are caused to collide with each other. The technical problems involved in constructing such a machine were such that the first experimental results were not obtained until the mid-1960s.

During work on the electron-electron collider, Richter began to think about the possibility of building an electron-positron collider. In this type of machine, the collision of an electron and a positron results in the annihilation of both particles with the formation of enormous amounts of energy. The production of that energy makes possible, in turn, the creation of many new and unusual particles.

It was with this type of collider, the Stanford Positron-Electron Accelerating Ring (SPEAR) that Richter and his team discovered an important new particle in 1974. The particle was unusual in that its lifetime was thousands of times greater than expected for its mass. It did, however, conform to predictions made some years earlier by Sheldon Glashow and his colleagues. These predictions involved the existence of a fourth type of quark known as the charm quark. The new particle discovered by Richter's team, named by them the (*psi*) *particle*, appears to consist of a charm quark and its antiparticle, the charm antiquark. A similar discovery, using a quite different technique, was made by Samuel Chao Chung Ting and his associates at the Brookhaven National Laboratory at almost the same time. The Ting group proposed naming the particle "J." It is now known as the *J particle*. For his part in this discovery, Richter shared the 1976 Nobel Prize for physics with Ting.