= Val Logsdon Fitch =

Val Logsdon Fitch (March 10 , 1923 ? February 5 , 2015) was an American nuclear physicist who , with co @-@ researcher James Cronin , was awarded the 1980 Nobel Prize in Physics for a 1964 experiment using the Alternating Gradient Synchrotron at Brookhaven National Laboratory that proved that certain subatomic reactions do not adhere to fundamental symmetry principles . Specifically , they proved , by examining the decay of K @-@ mesons , that a reaction run in reverse does not retrace the path of the original reaction , which showed that the reactions of subatomic particles are not indifferent to time . Thus the phenomenon of CP violation was discovered . This demolished the faith that physicists had that natural laws were governed by symmetry .

Born on a cattle ranch near Merriman , Nebraska , Fitch was drafted into the U.S. Army during World War II , and worked on the Manhattan Project at the Los Alamos Laboratory in New Mexico . He later graduated from McGill University , and completed his Ph.D. in physics in 1954 at Columbia University . He was a member of the faculty at Princeton University from 1954 until his retirement in 2005 .

= = Early life = =

Val Logsdon Fitch was born on a cattle ranch near Merriman , Nebraska , on March 10 , 1923 , the youngest of three children of Fred Fitch , a cattle rancher , and his wife Frances née Logsdon , a school teacher . He had an older brother and sister . The family farm was about 4 square miles (10 km2) in size , and was about 40 miles (64 km) from the site of the Wounded Knee Massacre . The ranch was a small one ; his father specialized in raising breeding stock . Soon after his birth , his father was badly injured in a horse riding accident and could no longer work on his ranch , so the family moved to the nearby town of Gordon , Nebraska , where his father entered the insurance business . It was here that he attended school , graduating from Gordon High School in 1940 as valedictorian .

= = Manhattan Project = =

Fitch attended Chadron State College for three years , then transferred to Northwestern University ; but this was during World War II , and his studies were interrupted by being drafted into the U.S. Army in 1943 . After he had completed basic training , the Army sent him to Carnegie Institute of Technology for training under the Army Specialized Training Program . Under this program , some 200 @,@ 000 soldiers attended colleges for intensive courses . Fitch was in the program for less than a year before the manpower requirements of the war became too great , and the Army terminated the program . Most of the soldiers in the ASTP were posted to combat units , but Fitch was one of a hundred or so ASTP soldiers who joined the Special Engineer Detachment (SED) , which provided much @-@ needed technicians to the Manhattan Project .

The Army sent Fitch to the Manhattan Project 's Los Alamos Laboratory in New Mexico . By mid @-@ 1944 , about a third of the technicians at Los Alamos were from the SED . While there , he met many of the greats of physics including Niels Bohr , James Chadwick , Enrico Fermi , Isidor Isaac Rabi , Bruno Rossi , Emilio Segrè , Edward Teller and Richard C. Tolman , in some cases attending courses on physics taught by them . He worked in the group headed by Ernest Titterton , a member of the British Mission , and became well @-@ acquainted with the techniques of experimental physics . He participated in the drop testing of mock atomic bombs that was conducted at Wendover Army Air Field and the Salton Sea Naval Auxiliary Air Station , and worked at the Trinity site , where he witnessed the Trinity nuclear test on July 16 , 1945 . He was discharged from the Army in 1946 , but continued to work at Los Alamos as a civilian for another year in order to earn some money . He would briefly return to Los Alamos in 1948 .

= = Academic career = =

His wartime experiences led Fitch to decide to become a physicist . Robert Bacher , the head of the physics division at Los Alamos , offered him a graduate assistantship at Cornell University , but first he needed to complete his undergraduate degree . Rather than return to Northwestern or Carnegie Mellon , he elected to enter McGill University , which Titterton had recommended . Fitch graduated from McGill with a bachelor 's degree in electrical engineering in 1948 . On the advice of Jerry Kellogg , who had been a student of Rabi 's at Columbia University , and was a division head at the Los Alamos , Fitch decided to pursue his doctoral studies at Columbia . Kellogg wrote him a letter of introduction to Rabi . James Rainwater became his academic supervisor . Rainwater gave him a paper by John Wheeler concerning mu @-@ mesic atoms , atoms in which an electron is replaced by a muon . These had never been observed ; they were completely theoretical and there was no evidence that they existed , but it made a good thesis topic .

Fitch designed and built an experiment to measure the gamma rays emitted from mu @-@ mesic atoms . As it turned out , this was a good time to search for them . Columbia had recently commissioned a cyclotron at the Nevis Laboratories that could produce muons ; Robert Hofstadter had developed the thallium @-@ activated sodium iodide gamma ray detector ; and wartime advances in electronics yielded advances in components such as new phototubes needed to bring it all together . Initially nothing was found , but Rainwater suggested expanding the search beyond the energy range predicted by Wheeler on the basis of the then @-@ accepted size of the radius of the atomic nucleus as around 1 @.@ 4 × 10 ? 15 m . When this was done , they found what they had been looking for , discovering in the process that the nucleus was closer to 1 @.@ 2 × 10 ? 15 m . He completed his Ph.D. in 1954 , writing his thesis on " Studies of X @-@ rays from mu @-@ mesonic atoms " . The thesis was published in the Physical Review in November 1953 .

In 1949 , Fitch married Elise Cunningham , a secretary who worked in the laboratory at Columbia . They had two sons . Elise died in 1972 , and in 1976 he married Daisy Harper Sharp , thereby acquiring two stepdaughters and a stepson . After obtaining his doctorate , Fitch 's interest shifted to strange particles and K mesons . He took a position at Princeton University , where he spent the rest of his career . He became a professor in 1960 , Fogg Brackett Professor in 1976 , and McDonnell Distinguished University Professor of Physics in 1987 , retaining this position until his retirement in 2005 . He was chair of the Physics Department from 1976 to 1981 .

Fitch conducted much of his research at the Brookhaven National Laboratory , where he became acquainted with James Cronin . The two of them played bridge at nights while they waited for the Cosmotron to become available . Cronin had built a new kind of detector , a spark chamber spectrometer , and Fitch realized that it would be perfect for experiments with K mesons (now known as kaons) , which Yale University physicist Robert Adair had suggested had interesting properties worth investigating . They could decay into either matter or antimatter . Along with two colleagues , James Christenson and René Turlay , they set up their experiment on the Alternating Gradient Synchrotron at Brookhaven . They discovered an unexpected result . The decay of neutral K mesons did not respect CP symmetry . K mesons that decayed into positrons did so faster than those that decayed into electrons . The importance of this result was not immediately appreciated ; but as evidence of the Big Bang accumulated , Andrei Sakharov realized in 1967 that it explained why the universe is largely made of matter and not antimatter . Put simply , they had found " the answer to the physicist ? s ' Why do we exist ? ' " For this discovery , Fitch and Cronin received the 1980 Nobel Prize in Physics .

In addition to the Nobel Prize , Fitch received the Ernest Orlando Lawrence Award in 1968 , the John Price Wetherill Medal in 1976 and the National Medal of Science in 1993 . He was a member of the Board of Sponsors of the Bulletin of the Atomic Scientists and the JASON defense advisory group . He was president of the American Physical Society from 1988 to 1989 , and he served on a number of governmental science and science policy committees , including the President 's Science Advisory Committee from 1970 to 1973 . He died at his home in Princeton , New Jersey , at the age of 91 on February 5 , 2015 .

= = Publications = =

Fitch , V. " Some Notes on Wideband Feedback Amplifiers " , Los Alamos National Laboratory , United States Department of Energy (through predecessor agency the Atomic Energy Commission) , (March 16 , 1949) .
Fitch , V. " A High Resolution Scale @-@ of @-@ four " , Columbia University , United States Department of Energy (through predecessor agency the Atomic Energy Commission) , (August 25 , 1949) .
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Cester , R. ; Fitch , V. L. ; Montag , A. ; Sherman , S. ; Webb , R. C. & M. S. Witherell . " Results on the Performance of a Broad Band Focussing Cherenkov Counter " , Princeton University , United States Department of Energy , (1980) .