= Robert R. Wilson =

Robert Rathbun Wilson (March 4 , 1914 ? January 16 , 2000) was an American physicist known for his work on the Manhattan Project during World War II , as a sculptor , and as an architect of the Fermi National Accelerator Laboratory (Fermilab) , where he was the first director from 1967 to 1978 .

A graduate of the University of California , Berkeley (BA and PhD) , Wilson received his doctorate under the supervision of Ernest Lawrence for his work on the development of the cyclotron at the Berkeley Radiation Laboratory . He subsequently went to Princeton University to work with Henry DeWolf Smyth on electromagnetic separation of the isotopes of uranium . In 1943 , Wilson and many of his colleagues joined the Manhattan Project 's Los Alamos Laboratory , where Wilson became the head of its Cyclotron Group (R @-@ 1) , and later its Research (R) Division .

After the war , Wilson briefly joined the faculty of Harvard University as an associate professor , then went to Cornell University as professor of physics and the director of its new Laboratory of Nuclear Studies . Wilson and his Cornell colleagues constructed four electron synchrotrons . In 1967 he assumed directorship of the National Accelerator Laboratory , subsequently known as the Fermilab . He managed to complete the facility on time and under budget , but at the same time made it aesthetically pleasing , with a main administrative building purposely reminiscent of the Beauvais Cathedral , and a restored prairie with a herd of American Bison . He resigned in 1978 in a protest against inadequate government funding .

= = Early life = =

Robert Rathbun Wilson was born in Frontier , Wyoming , in 1914 , the son of Platt Elvin and Edith Elizabeth (Rathbun) Wilson . He had an older sister , Mary Jane . His parents separated when he was eight years old , and custody was awarded to his father , although he lived with his mother from time to time . Much of his early life was spent on cattle ranches . He changed schools frequently , and attended a number of schools , including the Todd School in Woodstock , Illinois , where his grandmother worked .

Wilson entered the University of California , Berkeley , in 1932 , and was awarded his Bachelor of Arts (AB) degree cum laude in 1936 . He joined Ernest O. Lawrence 's Radiation Laboratory , which was at that time blossoming into the top American site for both experimental and theoretical physics due to the efforts of Lawrence and J. Robert Oppenheimer , respectively . Wilson received his Doctor of Philosophy (PhD) in 1940 for his thesis on " Theory of the Cyclotron " . That year he married Jane Inez Scheyer .

Wilson ran into trouble with Lawrence 's harsh frugality while working on his cyclotron and was fired twice from the Radiation Laboratory . The first time was for losing a rubber seal in the 37 @-@ inch cyclotron which prevented its use in a demonstration to a potential donor . He was later rehired at Luis Alvarez 's urging , but melted an expensive pair of pliers whilst welding , and was fired again . Though offered his job back , he decided instead to go to Princeton University to work with Henry DeWolf Smyth .

= = Manhattan Project = =

At Princeton , Wilson eventually took over Smyth 's project the development of an alternative approach to electromagnetic separation from Lawrence 's calutron method , used for the purpose of separating the fissile uranium @-@ 235 isotope of uranium from the much more common uranium @-@ 238 , which is a key step to producing an atomic bomb . By 1941 the project had produced a device called the " isotron , " which , unlike the calutron , used an electrical field to separate the uranium instead of a magnetic one .

The work at Princeton was terminated during World War II when Oppenheimer 's secret laboratory for research on the atomic bomb , the Manhattan Project 's Los Alamos National Laboratory , opened in 1943 . " Like a bunch of professional soldiers , " Wilson later recalled , " we signed up , en

masse , to go to Los Alamos . "

Wilson moved there with some of his Princeton staff and Harvard University 's cyclotron , and was appointed as head of the Cyclotron Group (R @-@ 1) by Oppenheimer . Only in his late twenties , he was the youngest group leader in the experimental division . The cyclotron would be used for measurements of the neutron cross section of plutonium .

When Oppenheimer reorganized the laboratory in August 1944 to focus on the development of an implosion @-@ type nuclear weapon , Wilson became head of R (Research) Division . As such he had four groups reporting to him : the Cyclotron Group (R @-@ 1) , still headed by himself ; the Electrostatic Group (R @-@ 2) , headed by John H. Williams ; the D @-@ D (Deuterium @-@ Deuterium) Group (R @-@ 3) , headed by John H. Manley ; and the Radioactivity Group (R @-@ 4) , headed by Emilio G. Segrè . In March 1945 , R Division acquired the additional responsibility of developing instrumentation for the Trinity nuclear test in July 1945 . Wilson helped stack boxes of explosives for the 100 @-@ ton test that preceded it . At Los Alamos , he was also active in community affairs , serving on the town council .

In May 1945 , when Nazi Germany surrendered , and the initial motivation for the crash atomic bomb project dissipated as it was discovered that the German nuclear energy project was years behind , Wilson raised the question of whether they should continue with their work . News of this met with an icy reception from Major General Leslie Groves , director of the Manhattan Project . In later life , when interviewed in the Oscar @-@ nominated documentary The Day After Trinity (1980) , Wilson would say that he should have strongly considered ceasing work on the bomb after the surrender of Germany , and regretted not doing so to some extent .

After the atomic bombing of Hiroshima and Nagasaki , Wilson helped organize the Association of Los Alamos Scientists (ALAS) , which called , with a scientists ' petition , for the international control of atomic energy . The petition was carried by Oppenheimer to Washington , D.C. , eventually making its way via Secretary of War Henry L. Stimson to President Harry S. Truman .

= = Post @-@ World War II = =

After the war , Wilson also helped form the Federation of American Scientists and served as its chairman in 1946 . He accepted an appointment as an associate professor at Harvard , but spent the first eight months of 1946 at Berkeley designing a new 150 MeV cyclotron for Harvard to replace the one taken to Los Alamos . At Harvard , Wilson published a seminal paper , " Radiological Use of Fast Protons " , which founded the field of proton therapy .

= = = Cornell = = =

In 1947 Wilson went to Cornell University as professor of physics and the director of its new Laboratory of Nuclear Studies . At Cornell , Wilson and his colleagues constructed four electron synchrotrons . The first , a 300 MeV synchrotron , was under construction when he arrived . In a 1948 report to the Office of Naval Research , he described their purpose :

The most important problems of nuclear physics , to our minds are : What are the elementary particles of which nuclei are made and what is the nature of the forces that hold these particles together ? A more general but connected problem concerns the general expression of electrical laws at such high energies as will be produced by our synchrotron . Our experiments are planned to attack all three problems . Thus we hope to produce artificial mesons which are supposedly elementary particles and to study the interactions of these mesons with nuclei . Further , we shall explore the electrical interactions of high energy electrons with electrons and protons in search of evidence pointing to a correct theory of electricity at high energy .

Wilson initiated the construction of a 1 @.@ 4 GeV synchrotron in 1952 . As he had foreseen in 1948 , it produced artificial K mesons and rho mesons , and tested quantum electrodynamics at short distances . The last machine he built at Cornell was a 12 GeV synchrotron that remains in use as an injector for the Cornell Electron Storage Ring (CESR) , built between 1977 and 1999 . It is located in what is now known as the Wilson Synchrotron Laboratory .

Wilson was one of the first physicists to use Monte Carlo methods , which he used to model electron and proton initiated particle showers . He invented the quantometer so that he could measure the intensity of high @-@ energy X @-@ ray beams .

= = = Fermilab = = =

In 1967 he took a leave of absence from Cornell to assume directorship of the nascent National Accelerator Laboratory at Batavia , Illinois , which was to be largest particle accelerator constructed to date . In 1969 , Wilson was called to justify the multimillion @-@ dollar machine to the Congressional Joint Committee on Atomic Energy . Bucking the trend of the day , Wilson emphasized it had nothing at all to do with national security , rather :

It only has to do with the respect with which we regard one another , the dignity of men , our love of culture ... It has to do with : Are we good painters , good sculptors , great poets ? I mean all the things that we really venerate and honor in our country and are patriotic about . In that sense , this new knowledge has all to do with honor and country but it has nothing to do directly with defending our country except to help make it worth defending .

Thanks to Wilson 's talented leadership , a management style very much adopted from Lawrence , the facility was completed on time and under budget . According to Wilson , he gave Atomic Energy Commission chairman Glenn T. Seaborg his assurance " signed in blood " that he would not exceed the authorized $ 250 million budget and " would rot in Hell " if he did . The facility centered on a four @-@ mile circumference , 400 GeV accelerator . Wilson subsequently initiated the design of the Tevatron , a 1 TeV particle accelerator . The National Accelerator Laboratory , was renamed the Fermi National Accelerator Laboratory in 1974 , after Enrico Fermi . It is frequently referred to as " Fermilab " .

Wilson had studied sculpture at the Accademia di Belle Arti di Firenze in Italy while on sabbatical in 1961 , and he wanted Fermilab to be an appealing place to work , believing that external harmony would encourage internal harmony as well , and labored personally to keep it from looking like a stereotypical " government lab " , playing a key role in its design and architecture . Surrounding the facility was a restored prairie which served as a home to a herd of American Bison that started with Wilson bringing in a bull and four cows in 1969 .

The site also had ponds , and a main building purposely reminiscent of the Beauvais Cathedral . Fermilab also celebrates his role as a sculptor , featuring several of his works , including " The Mobius Strip " , " The Hyperbolic Obelisk " , " Tractricious " , and " Broken Symmetry " . Another metal sculpture " Topological III " sits in the lobby of the Harvard Science Center . Fermilab 's Central Laboratory building was named Robert Rathbun Wilson Hall in his honor in 1980 .

Wilson served as the director of Fermilab until 1978 , when he resigned in protest against what he considered was inadequate funding by the Federal government . He then joined the faculty of the University of Chicago as Ritzma Professor at the Enrico Fermi Institute . He became Emeritus Professor of Physics at Chicago in 1980 . He moved to Columbia University , where he became I. I. Rabi Visiting Professor of Science and Human Relations in 1979 , Michael I. Pupin Professor of Physics in 1980 , and Emeritus Professor in 1982 . He retired in 1983 and moved back to Ithaca , NY .

= = Awards and honors = =

Wilson received many awards and honors , including the Elliott Cresson Medal from the Franklin Institute in 1964 , the National Medal of Science in 1973 , and the Department of Energy 's Enrico Fermi Award in 1984 . He was elected to the National Academy of Sciences and the American Philosophical Society , and was president of the American Physical Society in 1985 .

= = Death = =

Wilson suffered a stroke in 1999 , from which he never recovered . He died on January 16 , 2000 ,

at the age of 85 , at a nursing home in Ithaca , New York , and was buried at the 19th @-@ century Pioneer Cemetery on the Fermilab site . He was survived by his wife , Jane ; his three sons , Daniel , Jonathan and Rand ; and his sister , Mary Jane Greenhill . His papers are in the Cornell University Library .