= Charles Critchfield =

Charles Louis Critchfield (June 7 , 1910 ? February 12 , 1994) was an American mathematical physicist . A graduate of George Washington University , where he earned his PhD in Physics under the direction of Edward Teller in 1939 , he conducted research in ballistics at the Institute for Advanced Study in Princeton and the Ballistic Research Laboratory at the Aberdeen Proving Ground , and received three patents for improved sabot designs .

In 1943 , Teller and Robert Oppenheimer persuaded Critchfield to come to the Manhattan Project 's Los Alamos National Laboratory , where he joined the Ordnance Division under Captain William Parsons on the gun @-@ type fission weapons , Little Boy and Thin Man . After it was discovered that the Thin Man design would not work , he was transferred to Robert Bacher 's Gadget Division as the leader of the Initiator group , which was responsible for the design and testing of the " Urchin " neutron initiator that provided the burst of neutrons that kick @-@ started the nuclear detonation of the Fat Man weapon .

After the war he became a professor at the University of Minnesota , and then vice president for research at the Convair division of General Dynamics , where he worked on the Atlas family of rockets . In 1961 , J. Carson Mark and Norris Bradbury offered him a position at Los Alamos , which he held until he retired in 1977 .

= = Early life = =

Charles Louis Critchfield was born in Shreve , Ohio , on June 7 , 1910 , and grew up in Washington , D.C. He received his B.S. (1934) and M.A. (1936) degrees in Mathematics from George Washington University , where he also earned a PhD in Physics (1939) under the direction of Edward Teller .

During Critchfield 's graduate studies , Teller 's colleague George Gamow introduced him to Hans Bethe , with whom he wrote a paper in 1938 , which analyzed the nuclear fusion of protons into deuterons . The next year , Bethe showed that this process is a key link in the proton @-@ proton chain reaction and the CNO cycle , which are the major ways that nuclear energy is released in the solar core and in massive stars . In 1967 , Bethe was awarded the Nobel Prize for this work on stellar nucleosynthesis .

= = World War II = =

After he graduated , Critchfield taught optics for a year at the University of Rochester at the invitation of Victor Weisskopf . In 1940 , he was awarded a National Research Council fellowship , and went to work under Eugene Wigner at the Institute for Advanced Study in Princeton . At this time , Robert Kent had just recruited John von Neumann to the advisory board of the Ballistic Research Laboratory at the Aberdeen Proving Ground . Critchfield joined von Neumann and Wigner there on several visits .

In 1942 , after a brief stay at Harvard University , Critchfield went to the Carnegie Institution of Washington , where he continued his ballistic studies , which resulted in three patents for improved sabot designs . Because of his experience with ballistics , Teller and Robert Oppenheimer persuaded Critchfield to come to the Manhattan Project 's Los Alamos National Laboratory in 1943 , where he joined the Ordnance Division under Captain William Parsons . As leader of the target , projectile , and source group , he worked on the gun @-@ type fission weapons , Little Boy and Thin Man .

In April 1944 , the Manhattan Project experienced a crisis when Emilio Segrè discovered that plutonium made in nuclear reactors would not work in Thin Man . In response , Oppenheimer completely reorganized the laboratory to focus on development of an implosion @-@ type nuclear weapon in August . He reassigned Critchfield to a new Gadget Division under Robert Bacher , as the leader of the Initiator group . This group was responsible for the design and testing of the " Urchin " neutron initiator , which provided a burst of neutrons that kick @-@ started the nuclear

detonation of the Fat Man weapon .

= = Postwar = =

Critchfield left Los Alamos in 1946 and returned to George Washington University , but soon left to join Wigner at the Oak Ridge National Laboratory . In 1947 he became an assistant professor at the University of Minnesota , where he participated , with Edward P. Ney and John R. Winckler , in a classified project to improve balloon technology . Here , with Leland S. Bohl , he invented and patented the natural shape balloon , and participated , with Ney and his student Sophie Oleksa , in an early search for primary cosmic ray electrons .

In 1955 , after advancing to full professor at Minnesota , Critchfield became vice president for research at the Convair division of General Dynamics . Here , he worked on the Atlas family of rockets , which began as a series of ICBMs and evolved into launch vehicles for Project Mercury and many other space missions . He also created the Convair Scientific Research Laboratory whose staff were expected to serve as consultants for the company 's engineering divisions and to carry out basic scientific research . In 1957 , Critchfield 's student William C. Erickson joined the staff , and created the Clark Lake Radio Observatory . In 1963 , this facility , where observations focused on long wavelength radio waves , was transferred to the University of Maryland , where Erickson had become a professor . Although the original observatory has been abandoned , similar research continues at the much larger Long Wavelength Array in central New Mexico .

= = Later life = =

In early November 1959 , President Dwight D. Eisenhower 's Secretary of Defense Neil H. McElroy selected Critchfield to be head of the Defense Advanced Research Projects Agency . McElroy hoped that Critchfield would be able to fix the nation 's trouble missile program , but Critchfield was reluctant to serve at the director 's $ 19 @,@ 000 salary . McElroy then offered to let Critchfield serve without pay , with the government paying only his expenses of $ 15 per day , while allowing Critchfield to continue to draw his Convair salary of around $ 40 @,@ 000 . Critchfield accepted this offer , but ran into a storm of political and media criticism over the conflict of interest involved in heading an agency that did $ 4 million worth of business with Convair each year . Critchfield then withdrew his name from consideration .

In 1961 , Critchfield accepted a professorship at the University of Wisconsin , but before he moved to Madison , his friends at Los Alamos , J. Carson Mark and Norris Bradbury offered him a position there that he took instead . He held this position until he retired in 1977 , but he continued his association with the laboratory until his death after a long battle with cancer on February 12 , 1994 . His obituary in Physics Today was written by Carson Mark , Louis Rosen , Edward Teller , and Roger Meade .

Charles Critchfield is buried next to his wife , Jean , in Guaje Pines Cemetery in Los Alamos County , New Mexico .

= = External Links = =

1993 Audio Interview with Charles Critchfield by Richard Rhodes Voices of the Manhattan Project