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JOHN HARRY WILLIAMS

1908—1966

A Biographical Memoir by

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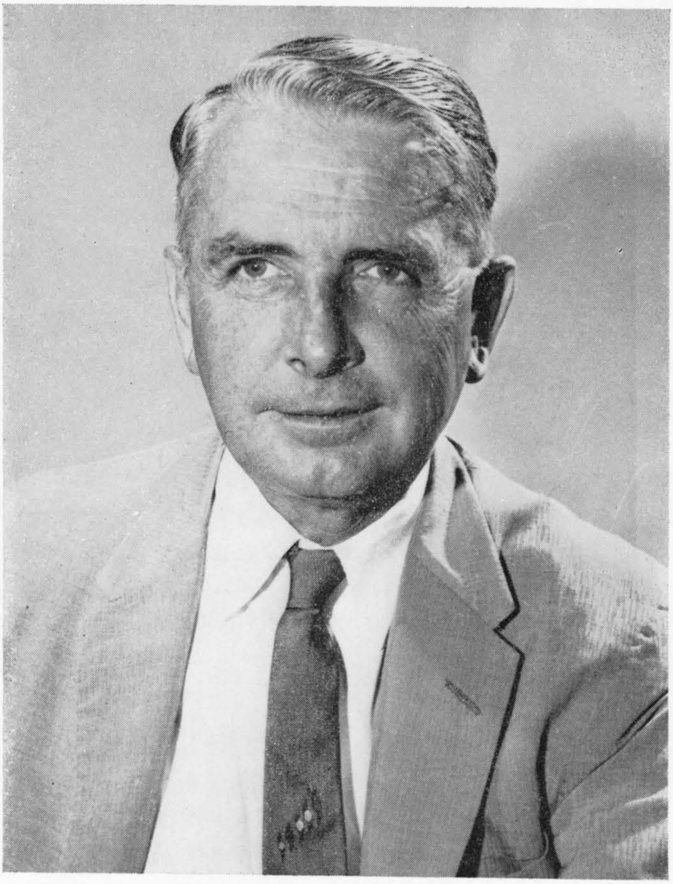
Biographical Memoir



John H. Williams

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July 7, 1908–April 18, 1966

BY ALFRED O. C. NIER

JOHN HARRY WILLIAMS was born in Asbestos Mines, Quebec. His father, who was a mining engineer and who served in the Canadian Army, died in World War I. John and his three brothers were raised by their widowed mother in the small town of Kelowna, British Columbia. Here he attended the public grade and high schools and had the good fortune to be stimulated by a superior teacher of science and mathematics, with the result that his talents in these areas readily became apparent. A scholarship enabled him to attend the University of British Columbia, from which he graduated with a major in physics in 1928.

His lifelong interest in sports and the outdoors dates back to his childhood, when swimming, hockey, camping, fishing, and hunting were natural activities along with his chores in the family orchard. In his senior year at the University of British Columbia he married Vera Martin, a teammate on the swimming team. Three children, Lloyd, Margaret Ann, and Susan, were born to the couple.

Willaims attributed his resolve to pursue graduate work to the chance he had to observe and learn from dedicated teachers in both high school and university. In 1928 he began his graduate studies at the University of California, Berkeley, and received his Ph.D. degree three years later. Because of his excellent undergraduate training, his research, under the direction of Professor Samuel K. Allison, began immediately upon entrance to the Graduate School. This led to a paper on a double crystal x-ray spectrometer by the end of the year. At this time Allison left Berkeley to accept a position at the University of Chicago. Williams completed his thesis work, corresponding with Allison as necessary. In 1931, when he received a National Research Council Postdoctoral Fellowship, he followed Allison to Chicago, where he spent two more profitable years that resulted in important publications on the widths and intensities of x-ray lines.

The summer of 1933 was spent as a writer for Science Service in Washington, D.C. In the fall he accepted a position as research assistant to Professor John T. Tate at the University of Minnesota. Here he joined in work on the ionization and dissociation of gases, for which the Minnesota laboratory had become famous, but his stay in the field was brief. This was the time when the frontiers of nuclear physics were being opened, so it was only natural that the resourceful and energetic John Williams, with the active encouragement of John Tate, should start a program in the exciting new field.

The laboratory already owned a 275-kev transformer-kenetron-condenser source of high voltage, and this was soon supplemented by an ion source, an ion accelerating tube, target chamber, counters, and pumping systems. Much of the equipment was constructed personally by Williams, for this was in a day when funds for research were limited. In his almost overwhelming task, Williams was soon joined by William H. Wells, a postdoctoral fellow, and several graduate students who began their distinguished careers under Williams' tutelage. The program prospered, and significant papers on disintegration processes in the light elements appeared.

A year after arriving at Minnesota, he was appointed as an instructor and began the progression through the academic ranks. By 1937 he was promoted to an associate professorship, a remarkable achievement since promotions in those dark depression days were very limited at Minnesota.

Neither Williams nor Tate was satisfied with the limited energies provided by their nuclear equipment, so work was started on a Van de Graaff generator which it was hoped would give energies up to one million electron volts. This instrument was never completed, because it became apparent that the University ought to embark on a much more ambitious program. It should be remarked that this was in a day when faculty were not generally relieved from teaching duties to perform research, so Williams, in addition to working actively to build a nuclear physics program—to a large extent with his own hands—carried a full teaching load which amounted to lecturing in two full courses plus teaching an advanced laboratory for part of the year.

During 1936 it was decided to construct a pressure Van de Graaff generator which would provide energies of at least 3 million electron volts. The cost was beyond the resources of the institution, so foundation help was sought. In the 1930s funds for pure physics research were practically unavailable, but there was a growing appreciation of the importance of nuclear physics research to biology and medicine, through providing either radioactive isotopes for tracer studies or energetic particles for investigation of the effects of such particles on biological materials. Accordingly, a committee of outstanding researchers in the University's biological, medical, and chemical departments, headed by John Tate of the Physics Department, and augmented by a strong group from the Mayo Foundation for Medical Education and Research (a division of the University Graduate School), approached the Rockefeller Foundation for a grant of $36,000 to build a Van de Graaff generator and to finance a program of interdisciplinary research using this facility.

At their meeting on April 7, 1937, the trustees of the Rockefeller Foundation approved the request and the project was launched. It is interesting to note that while the request was made in the name of a prestigious group of senior scientists in a variety of fields, the key man in the picture was the twenty-eight-year-old John Williams, who would have the responsibility for the design and construction of the machine. In the fall of 1937 he was joined by Lynn H. Rumbaugh, another very promising young faculty member. Until World War II intervened, they shared the responsibility for getting the new major facility into operation. Again, it should be stressed that much of the effort involved donning coveralls and helping with the actual construction and adjustment of the equipment. This firsthand experience was to stand Williams in good stead later when, during World War II, he had charge of the Van de Graaff work at Los Alamos and when, in his subsequent associations with the Atomic Energy Commission, he was called upon to evaluate difficult research problems in a wide variety of fields.

As the war clouds gathered in 1940, faculty members were leaving their posts to accept defense-related positions, and Rumbaugh left to go to the Naval Ordnance Laboratory. Tate had already gone to head Division 6 of the Office of Scientific Research and Development, so Williams, together with a full-time assistant and several graduate students, was left alone to administer and complete the construction of the generator. During early 1940 the first ion beam was obtained, and shortly thereafter actual experiments were undertaken. Because he was not yet a citizen, he was not able to work on defense-related research, a source of great regret to him. When he obtained his citizenship on January 19, 1942, he immediately undertook a program of neutron cross section measurements related to the atomic bomb project.

In March 1943, he, together with several students and colleagues, left for Los Alamos, where he was placed in charge of the two University of Wisconsin Van de Graaff generators which had been moved there for the purpose of making a variety of nuclear cross section measurements related to the design of atomic bombs and reactors. In 1945 he served as deputy director for the first atomic bomb test, and as the one in charge of the Services Division assumed responsibility for the wiring, power, transportation, communication facilities, and construction for this enormous undertaking. Along with his many scientific and technical responsibilities at Los Alamos he helped organize the school system and served as president of the School Board.

Although very much involved in his Los Alamos work, Williams kept up a constant correspondence with J. W. Buchta, chairman of the Minnesota Physics Department. With the exodus of faculty from the department during the war, research activity had come to a complete halt. Williams was very anxious that after the war the department should be restored and strengthened. The University administration seemed not to understand the profound changes which the war was bringing about, and appeared to assume that once hostilities ended one could merely pick up where one had left off. At Los Alamos Williams had the benefit of close contact with top physicists from all over the United States and gained a deep appreciation of how much the world of physics would be changed as a result of the war.

After helping with the Bikini bomb tests, he returned to Minnesota on April 1, 1946. Together with a group of students, some of whom had worked for him at Los Alamos, he plunged into an active program of remodeling and rebuilding the Minnesota Van de Graaff generator. By 1947 the machine was back in operation, and a long list of graduate students began their research careers under Williams' guidance.

Although the machine continued to produce useful research until 1967, when it was finally retired, Williams anticipated its obsolescence and, almost before it was back in operation after the war, made plans for a higher energy facility. He had a keen sense of the practical and recognized that the best chance for obtaining a new facility lay in presenting a proposal for an accelerator which was appropriate for an institution like the University of Minnesota, and which would produce useful research in an area in which fundamental data were badly lacking. The Atomic Energy Commission recognized the soundness of his reasoning and, in 1949, authorized the construction of a 50-MeV linear proton accelerator at Minnesota. At the time, this was the most powerful accelerator of its type and proved to be an extremely valuable facility for performing new and significant nuclear research. The energy range was later extended to 68 MeV, and at the time of this writing the machine is still in full-time operation.

While Williams had a very real interest in the actual experiments being performed, always taking his turn in shift operations, he was even more concerned that his younger colleagues on the staff, and the graduate students, should have proper facilities so that they might perform significant research and mature as physicists. Among other things, he pushed very actively for the development of adequate machine and electronic shop facilities in the department. The extremely high quality of these facilities in the department today is a fitting memorial to his passion for quality and efficiency. Had he chosen, he could have developed such excellence as a part of the nuclear physics program alone, but he insisted that to provide a healthy climate for all research the shop facilities must be an integral part of the department as a whole, rather than being associated with a particular research program.

The new linear accelerator was placed in operation in the early 1950s. If Williams had been a less energetic man he might have coasted and spent the rest of his days participating in occasional research with the machine, interspersed between the golf and pool games he thoroughly enjoyed. It was at this point that perhaps the most significant part of his career began.

Along with many others, he recognized that one of the most important unexplored areas of physics, if not the most important, lay in the detailed study of elementary particles, using ever higher energy accelerators. The enormous cost of such accelerators made it unlikely that they would be given to any one institution. Both the East and West Coasts of the United States had high energy facilities, but there were none in the Midwest —much to the disadvantage of the institutions in the area. He and colleagues of like mind in other major Midwest institutions convinced their respective institutions that they should create the Midwest Universities Research Association, a nonprofit organization dedicated to the study, design, and eventual construction of a significant high-energy facility in the Midwest. He was chairman of the site-selection committee, which chose an area near Madison, Wisconsin, as the location for the proposed accelerator.

From 1955 to 1958 he served on MURA's Board of Directors and in 1956-1957 was the President of the Association. The MURA Laboratory grew and became a significant research facility, making important contributions to the science and art of accelerator design. MURA members felt that high-energy physics in the Midwest could best be served by the construction of an accelerator under the control of a university group such as MURA, whereas the Atomic Energy Commission felt that the accelerator should be part of the Argonne National Laboratory, an AEC facility operated for the government under a contract with the University of Chicago. The AEC subsequently funded a 12.5-BeV accelerator at Argonne which indeed helped the high energy picture in the Midwest, as well as the nation. However, the MURA group, including Williams, did not feel that this was an adequate facility for the Midwest physicists and continued to push for an accelerator which they felt would be competitive with those in existence or proposed elsewhere.

The controversy highlighted the lack of rapport between the Argonne Laboratory and the Midwest university physicists. To improve the situation a number of positive steps were taken. Along with a number of other scientists, Williams accepted membership on the newly created Argonne National Laboratory Policy Advisory Board, an advisory committee to the Chancellor of the University of Chicago. Positive steps taken by this board included the establishment of visiting committees to the various divisions of the Laboratory, and the general improvement of communications and understanding. In his several roles and relationships with the Atomic Energy Commission, Williams distinguished himself not only as an excellent physicist but also as a fair-minded statesman of science, so that when the position of Director of the AEC's Research Division became vacant in 1958, he was asked to fill it.

Acceptance of the position meant he would have to leave his productive research career, the classes he truly enjoyed, and a comfortable life at Minnesota—for a frantic existence in Washington. Never known as a shrinking violet, he always fought hard for what he thought was right and combined this dynamic character with a deep sense of duty. When asked to accept the AEC position, he explained his feeling of obligation to his country as follows: "Every so often you have to put some chips back in the pot. I put some in in World War II and for the past ten years I have been taking them out. Now I guess the time has come to put more back in."

As Director of the Research Division of the AEC he studied its vast program and made important decisions relative to the country's long-range plans for nuclear research. He traveled widely and ably represented the needs of science to the Congress. In his dealings with the scientific community, he made many new friends and impressed everyone with the fairness and intelligence with which he approached his job.

After filling the position only a year, he was appointed as a Commissioner by President Dwight Eisenhower. He had been in this position only a few months when there was a recurrence of the cancer which had first striken him on July 16, 1951, the anniversary of the Trinity Atomic Bomb Test in which he had played such an important part. He returned to Minnesota in January 1960 for examination and treatment at the University Hospitals, where he remained for some weeks before returning to Washington. Here he received treatments at the Clinical Center of the National Institutes of Health. When he left Minnesota, most of his old friends assumed they would not see him again. Yet, on April 6, 1960, in his first public appearance since the previous December, he was the Commission's mainstay witness in an important congressional hearing concerning authorization of the $114 million Stanford Linear Accelerator Project.

Thanks to medical science and his own fortitude, the illness was controlled, and in the summer of 1960 he resigned from the AEC and returned to Minnesota, weak but filled with enormous courage and determination. He immediately plunged back into teaching and research. The AEC kept him in the "family" as a consultant after his resignation and by fall, when it was apparent that his health had improved, appointed him as a member of the General Advisory Committee to the Commission, a position he held until his death in 1966.

Virtually every year the cancer flared up. Once, it affected his larnyx, and for a long period he could talk in only a hoarse whisper. On another occasion, a hip was afflicted, and there was grave danger that he might be permanently bedridden. Again he recovered, and when he was well enough to leave the hospital, he refused to use a cane and for a long time employed a golf club as a substitute, the head serving as a handle.

In 1959 Williams was elected to the National Academy of Sciences and in 1963 to the presidency of the American Physical Society, an office he conducted with distinction during the term. Although no longer able to lecture he remained extremely active in his many other activities. After he returned to Minnesota in 1960, he again worried about the need for new facilities for nuclear research and, together with younger colleagues, planned for a new accelerator to replace the aging Van de Graaff machine and the linear proton accelerator. His dream came true in 1964 when the Atomic Energy Commission awarded a new 20-MeV "Emperor" Van de Graaff generator to the University of Minnesota. This was housed in a new laboratory building built from funds provided by the state and the National Science Foundation.

Meanwhile, on the national scene, he continued his interest in the health of Midwest physics and in January 1964 was appointed as chairman of a committee to study how the Argonne National Laboratory could be made more effective in carrying out its mission of serving the Midwest scientific community. This committee, appropriately named "the Williams Committee," arrived at the recommendation accepted by the Atomic Energy Commission that there should be a tripartite agreement between a group of universities, the University of Chicago, and the AEC for the management of the Argonne National Laboratory. The new organization of universities, the Argonne Universities' Association, Inc., would have over-all direction of policies and programs for the laboratory, and the University of Chicago would continue to operate the laboratory. In December 1965 Williams was named as the first president of the new association, a position he held until his unexpected death a few months later. Never willing to admit defeat and always anxious to do his share in any enterprise, he plunged into the work of the new association.

The new responsibility included innumerable meetings and weekly trips between Minneapolis and Chicago. It was on one of these journeys that he was stricken with influenza. Upon his return to Minneapolis his condition deteriorated, and a few days later he died of pneumonia. A dedication of the accelerator laboratories, naming them the John H. Williams Laboratory of Nuclear Physics, had been planned for May 3, 1966, but, because of his unexpected death just a few weeks before the proposed celebration, the occasion was changed to a combination memorial and dedication ceremony.

Throughout the years he maintained an interest in sports and the outdoors. He was an ardent golfer until deterioration of his health forced him to give up the game. In 1932, while at Chicago, he, S. K. Allison, and W. H. Zacharaisen started to take biennial fall canoe trips in Quetico Park, Ontario. After World War II it was decided to schedule the trips every year, since "there was less time left." The group was sometimes expanded to six. In spite of failing health, he missed none of the annual trips in the last six years of his life.

He was an active member of the Campus Club (the University of Minnesota Faculty Club) and served two terms on its board of directors. He is the only member in the history of the club to be twice elected to the presidency. As president of the club and later as chairman of the House Committee, he played a very active role in planning an expansion of the club in the years following World War II. While he was a very hard worker, he also believed in relaxation, and throughout his career at Minnesota could usually be found at the club's billiard or pool tables immediately following lunch.

He showed a strong competitive spirit both in work and in play. He was known for his keen sense of humor and thoroughly enjoyed a good story. During his many hospital confinements, he entertained his visitors with the newest jokes he had heard.

Both he and his wife were enthusiastic athletic fans and attended practically all the home games of the University teams in the major as well as the minor sports. He served on numerous all-university committees including, of course, that on intercollegiate athletics.

In 1958 he was awarded an Honorary Doctor of Science degree by his own alma mater, the University of British Columbia, and in 1960 an Honorary Doctor of Engineering degree by the Pennsylvania Military College.

John Williams left his mark wherever he went. He was known as an excellent teacher in both the undergraduate and graduate courses which he taught. His research was recognized for its quality and significance. He was a builder of men and laboratories. He distinguished himself as an administrator and statesman of science, as well as a counselor to those who needed help of either a personal or professional nature. His office door was never closed, and students and colleagues were always welcome. He showed the same concern for his graduate students as he did for his own children. He was enormously respected by those who worked for him, not alone for his own accomplishments, but even more because he was considerate and respectful of his fellow workers regardless of their status. His home was always open, and he and his wife were noted for the warmth and informality of their hospitality. Even without any of these accomplishments and attributes, he will be remembered for the example he set during his long illness, when he carried more than his share of responsibilities and faced the world with a courage found only in the truly great.

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KEY TO ABBREVIATIONS

Phys. Rev. = Physical Review
Rev. *Mod.* Phys. = Reviews of *Modern* Physics
Rev. Sci. Instr. = Review of Scientific Instruments

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