= Harrie Massey =

Sir Harrie Stewart Wilson Massey FRS (16 May 1908 ? 27 November 1983) was an Australian mathematical physicist who worked primarily in the fields of atomic and atmospheric physics .

A graduate of the University of Melbourne and Cambridge University , where he earned his doctorate at the Cavendish Laboratory , Massey became an independent lecturer in Mathematical Physics at the Queen 's University of Belfast in 1933 . He was appointed Goldsmid Professor of Applied Mathematics at University College London , in 1938 . During the Second World War , Massey worked at the Admiralty Research Laboratory , where he helped devise countermeasures for German magnetic naval mines , and at the Admiralty Mining Establishment in Havant , where he helped develop British naval mines . In 1943 , Mark Oliphant persuaded the Admiralty to release Massey to work on the Manhattan Project . He joined Oliphant 's British Mission at the Radiation Laboratory at the University of California , where they worked on the electromagnetic isotope separation process . When Oliphant returned to Britain in 1945 , Massey took over the Berkeley Mission .

Massey returned to University College , London , in October 1945 to find it badly damaged by bombing , and the Mathematics Department in dingy temporary accommodation . In 1950 he was appointed Quain Professor of Physics and head of the University College , London , Physics Department . The department was merged with Astronomy in 1973 , but he remained its head until he retired in 1975 . Under his direction , the Physics Department was reoriented towards particle physics and upper atmosphere physics . He worked with the Woomera Rocket Range to develop British Skylark rocket , and was on the governing board of the Anglo @-@ Australian Telescope . He was the chairman of the Committee on Space Research (COSPAR) from 1959 to 1978 , and of its British national chapter . He was also the first Chairman of the European Space Sciences Committee , and helped found the European Space Research Organization and the Mullard Space Science Laboratory at University College , London .

= = Early life = =

Harrie Stewart Wilson Massey was born in Invermay , Victoria , Australia , on 16 May 1908 , the only child of Harrie Stewart Massey , a miner , and his wife Eleanor Elizabeth née Wilson . He grew up in the rural community of Hoddles Creek , and enrolled in the local state school in 1913 . He received his Merit Certificate , normally awarded after completing the eighth grade , when he was nine , but due to his age he still had to stay there for another three years . He won a scholarship to University High School , and moved to Parkville with his mother in 1920 . At University High School he was president of the Science Club and vice captain of the cricket team .

= = Carrier = =

At the age of 16 , Massey won a scholarship to the University of Melbourne , which he entered in 1925 . He had thoughts of studying chemistry , but was impressed by the physics lectures given by Eric Hercus . This was a stroke of luck ; first year physics lectures were normally given by Thomas Laby . Massey recalled in 1980 that " in a fairly wide experience I would rate [Laby] the worst lecturer I have heard " . At the University he played cricket , billiards , tennis and baseball , which he played for the University . He was awarded his Bachelor of Arts (BSc) in physics with first class honours in 1928 , and a Bachelor of Arts (BA) in mathematics in 1929 . At a meeting of the Australasian Association for the Advancement of Science in Perth in August 1925 , he met a schoolteacher , Jessica Elizabeth Bruce . They were married on 11 January 1928 at the district registrar ? s office in Perth . They had a daughter , Pamela Lois .

At that time , the university did not offer a Doctor of Philosophy (PhD) program so Massey undertook a Master of Science (MSc) course , with both experimental and theoretical components . The former , in cooperation with Courtney Mohr , dealt with soft X @-@ ray deflection from metal surfaces ; the latter with wave mechanics . This involved translating numerous articles from German

journals such as Zeitschrift für Physik , Annalen der Physik and Physikalische Zeitschrift . His external examiner was Ralph Fowler from the University of Cambridge , who was Paul Dirac 's PhD supervisor .

In 1929 , with the benefit of an Aitchison travelling scholarship from the University of Melbourne , Massey went to Trinity College , Cambridge to perform research at the Cavendish Laboratory led by Ernest Rutherford . The scholarship expired after two years , but he was awarded an 1851 Exhibition Scholarship in 1931 . At this time the Cavendish Laboratory was one of the leading centres of physics in the world . In 1932 Cavendish laboratory scientists John Cockcroft and Ernest Walton split the atomic nucleus , James Chadwick discovered the neutron , and Patrick Blackett and Giuseppe Occhialini confirmed the existence of the positron .

Fowler was appointed as Massey 's supervisor although it was clear that he did not need any supervision per se . Massey obtained his PhD on the The Collisions of Material Particles in 1932 . Shortly afterwards , he co @-@ authored a book on atomic collision processes with Nevill Mott , Theory of Atomic Collisions (1933) . He also applied the theory of collisions to models of neutron structure . At the Cavendish laboratory , he also played hockey with Cockcroft , and cricket for the Cavendish Cricket Club , becoming team captain in his final year there .

In June 1933 Massey became an independent lecturer in Mathematical Physics at the Queen 's University of Belfast . He was the only member of the department until R. A. Buckingham arrived in 1934 . Despite having to give nine lectures a week , he found time to write his second book , Negative Ions (1938) , and began working on upper atmospheric physics . Frustrated with the tiresome and time @-@ consuming process of calculation , he had his physics workshop superintendent , John Wylie , build him a small @-@ scale differential analyzer , an analog computer that could solve differential equations , for just £ 50 . This was used to solve problems related to low temperature helium , and the photo @-@ ionisation of oxygen in the upper atmosphere .

Massey was appointed Goldsmid Professor of Applied Mathematics at University College London , in 1938 , following the death of L. N. G. Filon the previous year . He brought with him Buckingham , now an 1851 Exhibition Scholar himself , and David Bates , a promising graduate student . They brought the differential analyser with them to London , where it was destroyed by an air raid during the Second World War .

= = Second World War = =

Soon after the outbreak of war in September 1939 , the Germans began a naval mine campaign against Britain . The results were devastating . Nineteen ships totaling 59 @,@ 027 tons were sunk by mines in October , and 27 totaling 120 @,@ 958 tons in November , along with the destroyer HMS Blanche . Many more ships were damaged , including the cruiser HMS Belfast . The nature of the mines was initially unknown , but on 23 November 1939 , a bomb disposal team under Lieutenant Commander J. G. D. Ouvry recovered an intact aerial mine from a mudflat at Shoeburyness , and the threat was revealed to be a magnetic mine .

In December 1939 , Massey joined a group at the Admiralty Research Laboratory in Teddington led by Stephen Butterworth . They were soon joined by a number of other physicists , including Bates , Buckingham , Francis Crick and John Gunn . Together , they came up with a series of countermeasures that enable the Navy to successfully sweep the mines . With this in hand , Massey became Deputy Chief Scientist to the Scientific Section of Mine Design Department at the Admiralty Mining Establishment in Havant in early 1941 . This time , the job was to create mines as good as the German ones . Massey brought his team with him . While Bates worked on packaging to protect the mine when it was dropped from an aircraft , Buckingham and Gunn calculated its theoretical effectiveness , and Crick designed the circuitry . Their mine codenamed MX , was soon in service , and the group turned its attention to developing acoustic or pressure mines . On the retirement of A. B. Wood in 1943 , Massey became Chief Scientist at Havant .

After the August 1943 Quebec Agreement merged the British and American atomic bomb projects , Mark Oliphant persuaded the Admiralty to release Massey to work on the Manhattan Project . In

November 1943 , Massey set out with Oliphant for the Radiation Laboratory at the University of California in Berkeley in a B @-@ 24 Liberator bomber . The Radiation Laboratory 's part was to develop an electromagnetic isotope separation process . Massey was in charge of its Theoretical Group , which included American David Bohm and Australian Eric Burhop . They studied the characteristics of electric discharges in magnetic fields , today known as Bohm diffusion , and studied the ionization of uranium compounds used as feed in the electromagnetic uranium enrichment process such as uranium tetrachloride (UCl4) and uranium hexafluoride (UF6) . Oliphant returned to Britain in March 1945 , and was replaced as head of the British mission in Berkeley by Massey . Wartime papers produced by the group were collected and published in The Characteristics of Electrical Discharges in Magnetic Fields (1949) .

= = Later life = =

Massey returned to University College , London , in October 1945 to find it badly damaged by bombing , and the Mathematics Department in dingy temporary accommodation . He was allowed to pick his own lecturers , so he chose Bats , Burhop , Buckingham and Gunn . While they had to teach mathematics , they were free to choose their own research topics , so they chose to research physics , carrying out physical experiments . This situation lasted until 1950 , when Edward Andrade retired , and Massey was appointed Quain Professor of Physics and head of the University College , London , Physics Department . The department was merged with Astronomy in 1973 , but he remained its head until he retired in 1975 . He also served as University College , London 's Vice @-@ Provost from 1969 to 1973 .

When Massey took over the Physics Department , most of his physicists , including Bates , Buckingham , Burhop and Robert Boyd , moved with him . Like the Mathematics Department , it was still in temporary accommodation owing to bomb damage during the war . A new building was under construction , but to develop the technical infrastructure , Massey hired Harry Tomlinson , who had worked for him in the British Mission in Berkeley . The Department acquired several accelerators , including a 20 MeV synchrotron from the Atomic Energy Authority . Dick Jennings and Franz Heymann built two microtrons . Under Massey , the Physics Department moved away from researching the physics of metals and liquids , and focused on particle physics and upper atmosphere physics . Massey saw the potential of computers . He arranged with Andrew Booth for a copy of his All Purpose Electronic Computer , and recruited two programmers , Joan Lawson and Jane Wallace . When the University of London established a computing unit , Buckingham left to head it .

Elected a Fellow of the Royal Society of London in 1940 , Massey was awarded its Hughes Medal in 1955 , and its Royal Medal in 1958 . He was a member of the its council from 1949 to 1951 and again from 1959 to 1960 , before serving as its Physical Secretary and Vice @-@ President from 1969 to 1978 . He became a member of the Department of Scientific and Industrial Research 's Nuclear Physics Sub @-@ Committee in 1956 . When the National Institute for Research in Nuclear Science was founded in 1957 , he became one of the initial members of its governing board . He became a member of the Research Grants Committee in 1959 , and was chairman of the Council for Scientific Policy from 1965 to 1970 . He was knighted for his services in 1960 .

Rockets had seen enormous development for military purposes during the Second World War , and Massey saw their potential for studying the upper atmosphere . He became a major supporter of space science , and wrote a book on the subject , History of British Space Science (1984) . He was the chairman of the Committee on Space Research (COSPAR) , which was established by the International Council of Scientific Unions , from its founding in 1959 until 1978 , and also of the British National Committee for Space Research , its British national chapter . He was also the first Chairman of the European Space Sciences Committee , and helped found the European Space Research Organization and the Mullard Space Science Laboratory at University College , London .

Space science also gave Massey an excuse to visit Australia ; he made some twenty trips . He was involved in the testing of balloons for upper atmosphere research at the University of Melbourne 's site in Mildura , Victoria . As chairman of the Rocket Subcommittee of the Royal Society 's Gassiot

Committee , he visited the Weapons Research Establishment near Adelaide and the Woomera Rocket Range to discuss collaboration on the British Skylark rocket , which was test fired from Woomera in 1957 . He sought to develop a UK space program in cooperation in space with Australia , the United States and European countries . He was successful in building international cooperation , although his Black Knight project was cancelled in favour of Black Arrow , which launched Prospero , only satellite launched with a British launch vehicle , from Woomera in 1971 . He was involved in the negotiations leading to the establishment of the Anglo @-@ Australian Telescope at Siding Spring Mountain in New South Wales .

Massey received an Honorary Doctorate from Heriot @-@ Watt University in 1975 .

He was a United Kingdom member and deputy chairman its governing board from 1975 to 1980 , and chairman from 1980 to 1983 .

= = Death and legacy = =

After a long illness , Massey died at his home in Esher , Surrey , which Jessica had named " Kalamunda " , from the Australian Aboriginal word for the area in Western Australia where she had once lived , on 27 November 1983 . He was survived by his wife and daughter . The Royal Society / COSPAR Massey Award is named after him , as is the Harrie Massey Lecture Theatre and Harrie Massey Prize at University College , London , and the Harrie Massey Medal and Prize , jointly awarded by the Australian Institute of Physics and British Institute of Physics . His papers are in the University College , London , archives .