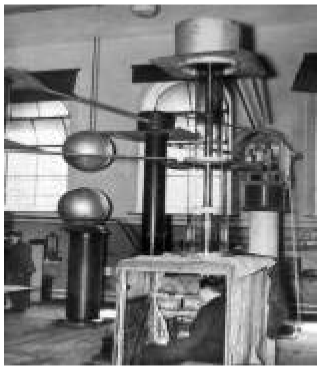
UNIVERSITY OF CAMBRIDGE

Sir John Cockcroft: Nobel Prize in Physics 1951


Sir John Cockcroft


Sir John Cockcroft was born in Todmorden, England, on May 27th, 1897. He was educated at Todmorden Secondary School and studied mathematics at Manchester University. After serving in the Royal Field Artillery he returned to Manchester to study electrical engineering at the College of Technology. After two years' apprenticeship he went to St. John's College, Cambridge, and took the Mathematical Tripos in 1924. He then worked for Lord Rutherford in the Cavendish Laboratory.

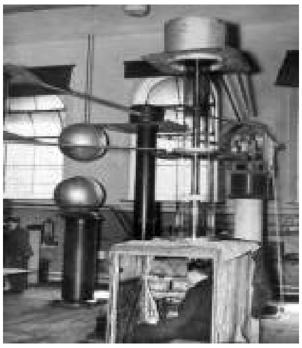
He first collaborated with Kapitsa in the production of intense magnetic fields and low temperatures. In 1928 he switched to work on the acceleration of protons by high voltages, and Ernest Walton soon joined in this work. In 1932 they succeeded in transmuting lithium and boron into high energy protons. In 1933, they managed to produce radioactivity and a wide variety of transmutations produced by protons and deuterons (the nucleus of the H^+ atom). In 1934 Cockcroft took charge of the Royal Society Mond Laboratory in Cambridge and continued pioneering research in transmutation of atomic nuclei. They built the famous “Cockcroft-Walton” machine to enable them to continue their research. Sir John Cockcroft and Ernest Walton received the Nobel Prize in Physics 1951, "for their pioneer work on the transmutation of atomic nuclei by artificially accelerated atomic particles".

In 1929 Cockcroft was elected to a Fellowship at St. John's College, Cambridge and became successively University demonstrator, lecturer and in 1939 Jacksonian Professor of Natural Philosophy. He was knighted in 1948. For the period 1954-1959 he was scientific research member of the U.K. Atomic Energy Authority, and afterwards continued this function on a part-time basis. He became the Master, Churchill College, Cambridge, in October 1959. In addition he was Chancellor of the Australian National University, Canberra, and President of the Institute of Physics, the Physical Society (1960 to 1962) and the British Association for the Advancement of Science (1961 to 1963).

He married Eunice Elizabeth Crabtree in 1925 and they had four daughters and a son. He died in 1967.

Ernest Walton: Nobel Prize in Physics 1951


Ernest Walton



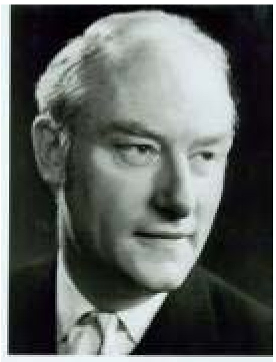
Ernest Walton was born at Dungarvan, on the south coast of Ireland on October 6th, 1903. In 1915 he began studying at the Methodist College, Belfast, where he excelled in mathematics and science, and in 1922 he entered Trinity College, Dublin. He graduated in 1926 with first class honours in mathematics and physics. He went on to receive his M.Sc. degree in 1927, and in the same year, he received a scholarship to work in the Cavendish Laboratory, Cambridge, for Lord Rutherford. He studied indirect methods for producing fast particles, working on the linear accelerator and on what was later to become known as the betatron.

He worked on the direct method of producing fast particles by the use of high voltages, in collaboration with Sir John Cockcroft. This was the turning point in his life. They built an apparatus, known as the Cockcroft-Walton Machine, which could show that various light elements could be disintegrated by bombardment with fast protons. This made it possible to disintegrate the nucleus of the lithium atom by bombardment with accelerated protons, and identify the products as helium nuclei. Their pioneering work on nuclei earned Walton the Nobel Prize in Physics 1951 (together with Cockcroft), "for their pioneer work on the transmutation of atomic nuclei by artificially accelerated atomic particles".

Walton was Clerk Maxwell Scholar at Cambridge from 1932 to 1934 when he returned to Trinity College, Dublin as a Fellow. He was appointed Erasmus Smith's Professor of Natural and Experimental Philosophy in 1946, and in 1960 he was elected Senior Fellow of Trinity College, Dublin. He was awarded the Hughes Medal, jointly with Sir John Cockcroft, by the Royal Society of London in 1938.

Walton married Freda Wilson in 1934 and they had two sons and two daughters, Alan, Marian, Philip, and Jean. He died in 1995. His son Alan is currently working in the Physics and Chemistry of Solids Group at the Cavendish Laboratory.

Francis Crick: Nobel Prize in Medicine 1962



Francis Crick

Francis Crick was born in a small town near Northampton, England. As a child, he was very inquisitive and he loved to read all kinds of books. His favourite books were ones about science. The science books inspired him to do experiments at home in his kitchen. His interest in science continued and he went on to study physics at University College London. Unfortunately the physics he learned in class was already out of date. He overcame this by continuing to teach himself at home, by reading more books and doing more experiments. His studies were interrupted by World War II. During the war he worked for the Admiralty, mostly designing and improving mines.

After the war he continued to work at the Admiralty, but he knew he did not want to design weapons for the rest of his life. The problem was that he was not sure what he did want to do. He liked reading, thinking, and talking about the new discoveries being made in biology. In the end, he decided that he wanted to study biology in more detail. He visited several labs and scientists to help him decide exactly where he wanted to work and exactly what he wanted to study. He finally settled at Strangeways Laboratory in Cambridge, where he worked on the effects of magnetism on cells.

In 1947, he moved to the Cavendish Laboratory in Cambridge to study proteins. He talked louder and faster than anyone else and was interested in all the experiments going on around him, not just his own study of proteins. Unfortunately his loud laugh would often annoy Professor Bragg, his supervisor!

Francis Crick was very interested in how genetic information was communicated, and believed that DNA could be the key. When James Watson arrived in Cambridge in 1951 they became friends immediately. They began working together to discover the structure of DNA. In 1953 they built the first accurate model of the structure of DNA. Their model showed that the structure of DNA is a double helix, like a twisted ladder. In 1962, Francis Crick shared the Nobel Prize for Physiology or Medicine with James Watson and Maurice Wilkins who, with Rosalind Franklin, provided the data on which the structure was based.

Even after the discovery of the structure of DNA, there were still questions about how DNA stored and used information. Francis Crick continued to study DNA to try and figure out how it helps to build molecules. In 1961, Francis Crick and Sydney Brenner showed how RNA is used to read the information stored in DNA.

For most of his career, Francis Crick worked for the Medical Research Council in Cambridge. In 1976, he moved to the Salk Institute in California, and began studying how the brain develops. In 1988, he wrote about his experiences in What Mad Pursuit: A Personal View of Scientific Discovery. He is generally described as being very bright and having a dry, British sense of humour. He swims every day to keep healthy and still loves to talk about science.

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James Watson: Nobel Prize in Medicine 1962

James Watson

James Watson was born in Chicago in 1928. From an early age he was bright and inquisitive and wasn't satisfied with simple answers. As a child he spent a lot of time bird-watching with his father.

He began studying for an undergraduate degree in Zoology at University in Chicago at the age of 15. He did well in courses that interested him, like biology and zoology, and not as well in other courses. At this time his ambition was to go to graduate school and study to become the curator of ornithology at the Field Museum of Natural History in Chicago. He went to graduate school at Indiana University and received a doctorate in 1950. While he was studying, he became very interested in genetics. In September 1950 he moved to Copenhagen to begin studying the effect of DNA on viruses.

From Copenhagen he moved to Cambridge to work at the Cavendish Laboratory to learn more about how X-rays were used to study large molecules. At the Cavendish Laboratory he shared an office with Francis Crick, a Ph.D. student who was also interested in the structure of DNA. Although both were supposed to be working on other projects, they continued to study DNA. In 1953 they built the first accurate model of the structure of DNA. In 1962, James Watson shared the Nobel Prize for Physiology or Medicine with Francis Crick and Maurice Wilkins who, with Rosalind Franklin, provided the data on which the structure was based.

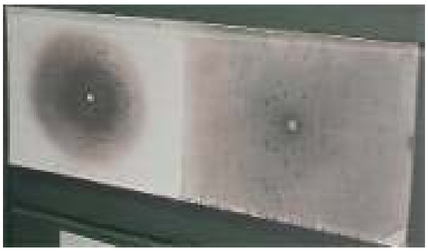
Following the discovery of the structure of DNA, James Watson continued to work in molecular genetics. He left Cambridge in 1956 and went to work in the Biology department at Harvard University. He became Director of Cold Spring Harbor Laboratory in 1968. He wrote The Double Helix: A Personal Account of the Discovery of the Structure of DNA, which was first published in 1968. This book was the first to describe how scientists work, and has never been out of print. He has played a significant role in many important areas, from fighting diseases like cancer to the Human Genome Project and he is now President of Cold Spring Harbor Laboratory.

One of his major interests is education and he has written many biology text books. He is actively exploring new approaches to education through projects being developed at the DNA Learning Center, the educational arm of Cold Spring Harbor Laboratory.

One of his other major interests is tennis, which he began playing regularly at Indiana University, and he still tries to play every day.

Max Perutz: Nobel Prize in Chemistry 1962

Max Perutz



Max Perutz was born in Vienna, Austria on May 19th, 1914. Both his parents came from families of textile makers that had become rich by introducing mechanical spinning and weaving into the Austrian Monarchy in the 19th century. He went to a grammar school called the Theresianum in Vienna. His parents suggested that he should study law in preparation for entering the family business, but he was inspired to study chemistry by one of his teachers. He easily persuaded his parents to let him follow his own interest.

Max Perutz began studying chemistry at Vienna University in 1932. He did not enjoy some parts of the course, such as inorganic analysis. However, he was very interested in other parts, such as organic chemistry, and especially by organic biochemistry. He decided that he wanted to come to Cambridge to study more organic biochemistry and work for his Ph.D. thesis. He came to the Cavendish Laboratory in Cambridge to work with John Desmond Bernal in 1936, with financial support from his father. He has stayed working in Cambridge for the rest of his career.

After Hitler's invasion of Austria and Czechoslovakia, Max Perutz's parents became refugees, and his own sources of money were soon exhausted. Fortunately, he was appointed research assistant to Sir Lawrence Bragg from January 1st, 1939, paid for by the Rockefeller Foundation. His work was interrupted several more times for various reasons during the war. His career became more stable in 1945, when he was given an Imperial Chemical Industries Research Fellowship. Then, in October 1947, he was made head of the newly created Medical Research Council Unit for Molecular Biology. The only other member of staff when the Unit opened was Sir John Kendrew. The Unit is now incorporated in the Medical Research Council's Laboratory of Molecular Biology (LMB) on Hills Road in Cambridge, along with other groups working on similar problems that were previously scattered around Cambridge. In 1962 he was made Chairman of the LMB, which now houses over 400 people.

Max Perutz's interest in organic biochemistry led him to study biological molecules using X-ray diffraction. In 1953, shortly after the discovery of the structure of DNA, he realised that attaching a single large atom (e.g. Mercury) to a molecule would change the X-ray diffraction pattern obtained from the crystal, making it possible to completely solve the structure of that molecule. He and Sir John Kendrew used this doping technique to discover the structures of haemoglobin and myoglobin. Max Perutz shared the Nobel Prize in Chemistry in 1962 with Sir John Kendrew for this work. He was also made Companion of the British Empire in 1962. Following his "retirement" in 1979 he continued to work at the LMB almost every day. He continued to study haemoglobin to help develop useful drugs for cancer treatments. He also studied other biological molecules to try and help develop treatments for Huntington's disease.

Max Perutz was a keen mountaineer, and his other interests included walking, skiing and gardening. He died of cancer on 6th February 2002.

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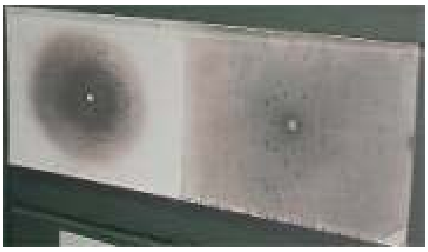
Sir John Kendrew: Nobel Prize in Chemistry 1962

Sir John Kendrew



Sir John Kendrew was born in Oxford on 24th March, 1917. He attended the Dragon School in Oxford (1923-1930) and then Clifton College in Bristol (1930-1936), where he was inspired by an outstanding chemistry teacher. He came to Trinity College, Cambridge, in 1936 and graduated in Chemistry in 1939.

Sir John Kendrew spent the first few months of the war studying reactions in the Department of Physical Chemistry at Cambridge. He then worked for the Air Ministry Research Establishment (later the Telecommunication Research Establishment) developing radar, and went on to do operational research for the Royal Air Force, working in Coastal Command, the Middle East, and South East Asia (where he was Scientific Adviser to the Allied Air Commander-in-Chief). During his time in Ceylon (now Sri Lanka) he met John Desmond Bernal and they spent time discussing X-ray diffraction by proteins. He decided that he would like to work at the Cavendish Laboratory studying proteins when the war was over. He returned to Cambridge in 1946 and began studying proteins with Max Perutz at the Cavendish Laboratory, under the direction of Sir Lawrence Bragg. He began by studying haemoglobin from sheep, and went on to study myoglobin from horses, diving mammals and birds. He also developed new techniques in X-ray crystallography.

Sir John Kendrew shared the Nobel Prize in Chemistry in 1962 with Max Perutz for their discoveries of the structures of myoglobin and haemoglobin, and the development of the new technique they used to make these discoveries. He was also made Companion of the British Empire in 1962, and knighted in 1974.

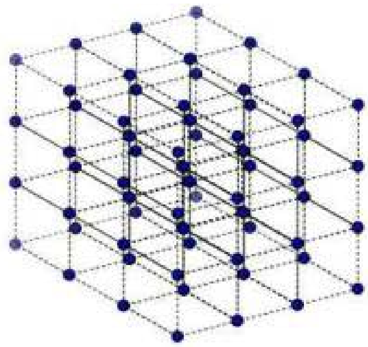
Max Perutz described Sir John Kendrew as “outstandingly able, resourceful, meticulous, brilliantly organised, knowledgeable, hard worker and a stimulating companion with wide interests in science, literature, music and the arts".

Sir John Kendrew and Max Perutz were the first two members of the Medical Research Council Unit for Work on Molecular Structure of Biological Systems, which was created at the Cavendish Laboratory in 1947. The Unit is now incorporated in the Medical Research Council’s Laboratory of Molecular Biology (LMB) on Hills Road in Cambridge, along with other groups working on similar problems that were previously scattered around Cambridge. John Kendrew was Deputy Director of the LMB from its opening in 1962 until 1974.

Sir John Kendrew was also a talented diplomat. He spoke fluent German, French and Italian and was a devoted European. He was the main advocate for the creation of the European Laboratory of Molecular Biology in Heidelberg, and became its first director in 1974. This great laboratory stands as testament to his skills both as a scientist and as a diplomat. He died in August 1997 in Cambridge aged 80.

Dorothy Hodgkin: Nobel Prize in Chemistry 1964

Dorothy Hodgkin



Dorothy Hodgkin was a British descendant, born in Cairo, Egypt, on May 12th, 1910. She became interested in chemistry at about the age of 10, and this interest was encouraged by a doctorate friend of her parents. Dorothy was allowed to join the boys doing chemistry at school. Before entering university, she had decided to study chemistry and biochemistry. She studied at Somerville College, Oxford, from 1928 to 1932. At Oxford, she attended a special course in crystallography and decided to do research in X-ray crystallography in Cambridge, working from 1932 to 1936 with John Desmond Bernal at the Cavendish Laboratory. In 1933, Somerville College gave her a research fellowship and in 1937, she obtained her PhD at the University of Cambridge.

Dorothy is known as a founder of the science of protein crystallography. She and her mentor, J.D. Bernal, were the first to successfully apply X-ray diffraction to crystals of biological substances, especially steroids, in 1934. Dorothy's contributions to crystallography included discoveries of the structures of cholesterol, tobacco mosaic virus, penicillin, vitamin B-12, and insulin (a solution on which she worked for 34 years), with the aid of X-ray diffraction techniques. Her discoveries were important because these could determine the best methods of production of penicillin, which was used to prevent wound infection during World War II. Dorothy was awarded the Nobel Prize in Chemistry 1964, "for her determinations by X-ray techniques of the structures of important biochemical substances".

Dorothy spent most of her working life as a Fellow and Tutor in Natural Science at Somerville College, Oxford, responsible mainly for teaching chemistry in the women's colleges. She became a University lecturer and demonstrator in 1946, University Reader in X-ray Crystallography in 1956 and Wolfson Research Professor of the Royal Society in 1960.

In 1937 she married Thomas Hodgkin, a historian. They had three children and three grandchildren. She died in 1994.

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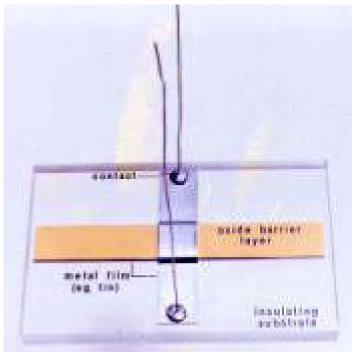
Brian Josephson: Nobel Prize in Physics 1973


Brian Josephson



Brian Josephson was born in Cardiff, Wales, on January 4th, 1940. He grew up in Cardiff and attended Cardiff High School. In 1957 he entered Trinity College, Cambridge, specialising in physics. He received his BSc in 1960 and became a research student at the Cavendish Laboratory, receiving his Ph.D. in 1964, publishing his first work while still an undergraduate.

While still an undergraduate, Josephson became interested in superconductivity, and he explored the properties of a junction between two superconductors that later came to be known as a Josephson junction. Josephson extended the earlier work of Esaki and Giaever in tunneling, the phenomenon by which electrons functioning as radiated waves can penetrate solids. He showed theoretically that tunneling between two superconductors could have very special characteristics, for example, flowing across an insulating layer without the application of a voltage. If a voltage is applied, the current stops flowing and oscillates at high frequency. This is now known as the Josephson effect. Experimentation confirmed Josephon’s theory, and its confirmation in turn reinforced the earlier theories of superconductor behaviour. He received the Nobel Prize in Physics 1973, “for his theoretical predictions of the properties of a super-current through a tunnel barrier, in particular those phenomena which are generally known as the Josephson effects”

By 1980, researchers at IBM had assembled an experimental computer switch structure applying Josephson's discoveries with superconductors. This improved switching speeds from 10 to 100 times faster than those of conventional silicon-based chips, increasing data processing capabilities by a vast amount.

Josephson was elected a fellow of Trinity College in 1962. He was a visiting professor at the University of Illinois in 1965-66. In 1967 he returned to Cambridge as an assistant director of research. He became a Professor of Physics in 1974. Eventually Josephson grew interested in the discovery of the cross-relevance between Eastern mysticism and scientific understanding. Over the past 20 years, he has published many papers about Mind-Matter relationships. Currently, he is working at the Cavendish Laboratory, Cambridge, and he is the director of the Mind-Matter Unification Project.

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Sir Martin Ryle: Nobel Prize in Physics 1974

Sir Martin Ryle

Sir Martin Ryle was born in Brighton, Sussex, England, on September 27, 1918. He was educated at Bradfield College and the University of Oxford, where he graduated in 1939. During the war periods, he worked on the development of radar and other radio systems for the Royal Air Force.

In 1945 J.A. Ratcliffe invited Ryle to work at the Cavendish Laboratory, Cambridge, starting an investigation of the radio emission from the Sun, which had recently been discovered accidentally with radar equipment. In 1948 Ryle was appointed to a Lectureship in Physics and in 1949 elected to a Fellowship at Trinity College, Cambridge. In 1959 he was appointed as a new Professor of Radio Astronomy, and in 1972 was appointed Astronomer Royal.

Ryle enjoyed working at the Cavendish, where both Ratcliffe and Sir Lawrence Bragg gave him enormous support and encouragement. Through many years of hard work and testing, Ryle developed revolutionary radio telescope systems, including the aperture synthesis technique, using them for accurate location of weak radio sources. With this novel equipment, he observed the most distant known galaxies of the universe. His contributions led to the discovery of numerous radio galaxies and quasars (quasi-stellar radio sources). Ryle and Antony Hewish shared the Nobel Prize for Physics 1974, the first Nobel prize awarded in recognition of astronomical research, “for their pioneering research in radio astrophysics: Ryle for his observations and inventions, in particular of the aperture synthesis technique, and Hewish for his decisive role in the discovery of pulsars”.

In 1947 he married Rowena Palmer, and they had two daughters and a son. Ryle received many medals, including the Gold Medal, Royal Astronomical Society, London, in 1964, and the Royal Medal, Royal Society of London in 1973. He was knighted in 1966. Ryle had honorary doctorate degrees from University of Strathclyde, University of Oxford and Nicholas University of Torun, Poland. His favourite hobbies were sailing and building small boats. He died in 1984.

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Anthony Hewish: Nobel Prize in Physics 1974

Anthony Hewish

Anthony Hewish was born in Fowey, Cornwall, England, on 11 May 1924. He was educated at King's College, Taunton and went to the University of Cambridge in 1942. From 1943-46 he was engaged in war service at the Royal Aircraft Establishment, Farnborough and also at the Telecommunications Research Establishment, Malvern. He was involved with airborne radar-counter-measure devices and he also worked with Martin Ryle. Returning to Cambridge in 1946, he continued his studies. After graduating in 1948, he joined Ryle's research team at the Cavendish Laboratory. He obtained his Ph.D. in 1952, became a Research Fellow at Gonville and Caius College, and in 1961 transferred to Churchill College as Director of Studies in Physics. He was a Lecturer during 1961-69, Reader during 1969-71 and Professor of Radio Astronomy from 1971 to 1989.

With colleagues, he confirmed in 1964 that the solar wind caused quasars to scintillate, and he exploited this discovery to make the first ground-based measurements of the solar wind-speed. In 1967 he completed the construction of a unique radio telescope specially designed to observe quasars at very high angular resolution by means of the same scintillation. With this telescope, and the help of his graduate student, Jocelyn Bell, Hewish detected the first pulsar, a new classification of stars. Hewish shared the Nobel Prize for Physics in 1974 with Ryle, the first Nobel prize awarded in recognition of astronomical research, “for their pioneering research in radio astrophysics: Ryle for his observations and inventions, in particular of the aperture synthesis technique, and Hewish for his decisive role in the discovery of pulsars”.

From 1982-88, Hewish was the head of the Cambridge Radio Astronomy Group and was also the head of the Mullard Radio Astronomy Observatory. Hewish was married in 1950. He has one son and one daughter. He officially retired in 1989, but he continues to work part-time in the Astrophysics Group at the Cavendish Laboratory.

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Sir Nevill Mott: Nobel Prize in Physics 1977


Sir Nevill Mott

Sir Nevill Mott was born in Leeds, England, on September 30th, 1905. He was educated at Clifton College, Bristol and entered St. John's College, Cambridge in 1924, where he studied mathematics and theoretical physics. At the Cavendish Laboratory he worked on collision theory and nuclear problems. In 1933 he became the chair of theoretical physics at Bristol, and changed his research interests to the properties of metals and semiconductors. His work included theoretical studies of transition metals, rectification and hardness of alloys and also the physics of photographic images.

In the 1960s, Mott's studies of electrical conduction in various metals led him to explore the conductivity potential of amorphous materials, which are so called because their atomic structures are irregular or unstructured. He devised formulas describing the transitions that glass and other amorphous substances can make between electrically conductive (metallic) states and insulating (non-metallic) states, thereby functioning as semiconductors. These glassy substances, which are relatively simple and cheap to produce, eventually replaced more expensive crystalline semiconductors in many electronic switching and memory devices, and this in turn led to more affordable electronic devices, such as personal computers. He was awarded the Nobel Prize in Physics 1977 (shared with Anderson and van Vleck), "for their fundamental theoretical investigations of the electronic structure of magnetic and disordered systems".

In 1954 Mott was appointed Cavendish Professor of Physics, a post that he held until 1971, serving on numerous government and university committees. He also became the Master of Gonville and Caius College, Cambridge, from 1959-66. He was President of the International Union of Physics from 1951 to 1957. Mott was knighted in 1962.

Outside physics research he took a leading part in the reform of science education in the United Kingdom and was actively involved in dealing with educational problems. In 1930 he married Ruth Eleanor Horder. They had two daughters and three grandchildren. He died on August 8, 1996.

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Phillip Anderson: Nobel Prize in Physics 1977

Phillip Anderson

Phillip Anderson was born in Urbana, Illinois, USA, in 1923. His happiest moments as a child and adolescent were spent hiking, canoeing, vacationing, picnicking, and singing around the campfire. Later, he received a national scholarship and went to Harvard University. After graduation, he worked in the Naval Research Laboratory during 1943-45. He went back to Harvard Graduate School in 1945 and spent four years there. After getting his PhD in 1949, he worked at Bell Laboratories, where he was involved in many solid-state physics projects.

A turning point in his research career was his arrival in Cambridge, England, in 1961. He first spent a year at the Cavendish Laboratory and Churchill College. He met Brian Josephson, and began working on a project based on the Josephson effect. In 1967 Nevill Mott invited him to work at the Cavendish Laboratory, jointly leading the Theory of Condensed Matter Group with Volker Heine. He did this for eight years, being actively involved in research, administration and teaching.

Anderson investigated the inter-atomic effects that influence the magnetic properties of metals and alloys, devising a theoretical model known as the Anderson model to describe the effect of the presence of an impurity atom in a metal. He also described the movements of impurities within crystalline substances by a method now known as Anderson localization. He also studied the relationship between superconductivity, superfluidity, and laser action, and predicted the existence of resistance in superconductors. His studies of disordered glassy solids indicate that they could be used instead of the expensive crystalline semiconductors in many electronic devices, such as computer memories and electronic switches. He was awarded the Nobel Prize in Physics 1977 (shared with Mott and van Vleck), "for their fundamental theoretical investigations of the electronic structure of magnetic and disordered systems".

Anderson married Joyce Gothwaite during his Harvard Graduate School years. They have a daughter. Since his retirement in 1984 from Bell Laboratories, he has enjoyed relaxing, writing and travelling.

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Pjotr Kapitsa: Nobel Prize in Physics 1978

Pjotr Kapitsa

Pjotr Kapitsa was born in Kronstadt, Russia, on the 9th July 1894. After completing his studies in 1918 at the Electromechanics Department of the Petrograd Polytechnical Institute, Kapitsa began his scientific career at that institute. He proposed a method for determining the magnetic moment of an atom interacting with an inhomogeneous magnetic field. This method was later widely used in magnetic physics.

In 1921 Kapitsa came to the Cavendish Laboratory, Cambridge, to work with Rutherford, researching in nuclear physics. After a few years in Cambridge, Kapitsa turned to low-temperature research. He began with a critical analysis of the traditional methods for obtaining low temperatures and developed a new and original apparatus for the liquefaction of helium in 1934. Kapitsa began a series of experiments to study the properties of liquid helium that led to the discovery of the superfluidity of helium in 1937. In 1939 he developed a new method for liquefaction of air with a low-pressure cycle using a special high-efficiency expansion turbine. He then wrote a series of papers investigating this new state of matter. Late in the 1940's he began working on physical problems for low-temperature physics. He also invented high-power microwave generators and discovered a new kind of continuous high-pressure plasma discharge with electron temperatures over a million K. Thus, he was awarded the Nobel Prize in Physics 1978, "for his basic inventions and discoveries in the area of low-temperature physics".

Kapitsa was a Clerk Maxwell Student at the University of Cambridge (1923-1926), Assistant Director of Magnetic Research at the Cavendish Laboratory (1924-1932), Messel Research Professor of the Royal Society (1930-1934), and Director of the Royal Society Mond Laboratory (1930-1934). Kapitsa was one of the founders of the Moscow Physico-Technical Institute (MFTI). He was also an honourary member of the Russian Academy of Sciences. He married Anna Krylova in 1927. They had two sons. He died in 1984.

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Allan Cormac: Nobel Prize in Medicine 1979

Allan Cormac

Allan Cormac was born in Johannesburg, South Africa, in 1924. He attended the Rondebosch Boys High School. He went to the University of Cape Town and studied electrical engineering. Later, he turned to physics and graduated with bachelor and master degrees in physics. After graduation, he went to St. John's College, Cambridge and worked at the Cavendish Laboratory under Prof. Otto Frisch on problems connected with He^6, which is an important component in Biological Physics. He returned to Cape Town in 1950, accepting a post as a Lecturer in Nuclear Physics.

At Cape Town, Cormac specialised in nuclear physics. In 1956 he became interested in medical physics, especially an area known as computerized axial tomography (CAT) scanning. In 1963, by the ingenious use of mathematical techniques which he first encountered in X-ray crystallography, he generalised his CAT theory substantially. His interest in X-ray technology led him to develop the theoretical foundations that made computerized axial tomography (CAT) scanning possible. He published his results in two papers in 1963–64, but these generated little interest until the first CAT scan machine, built under the leadership of Godfrey Hounsfield, was introduced in 1972 in a London hospital. Now CAT scanning machines have become standard and are widely used in hospitals around the world. Cormac received the Nobel Prize in Medicine 1979 (shared with Hounsfield), "for the development of computer assisted tomography".

Outside academic research, Cormac was very actively involved in a wide range of activities: tennis, travelling, swimming, sailing and his favourite hobby, reading. From 1958 onwards, Cormac began working for the Physics Department, Tufts University, MA, USA, where he became the Chairman from 1968 to 1976. He married Barbara Seavey during his time as a research student at the Cavendish Laboratory and they had two daughters and one son. He died in 1998.

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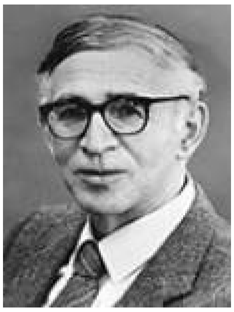
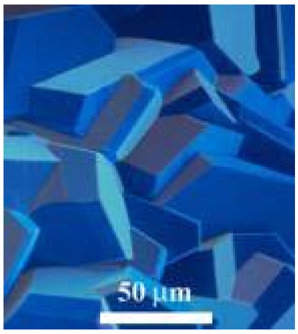
Sir Aaron Klug: Nobel Prize in Chemistry 1982



Sir Aaron Klug



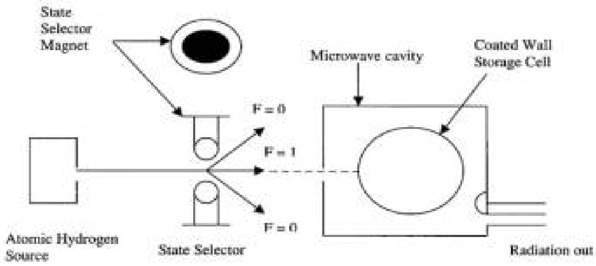
Sir Aaron Klug was born in 1926 in Zelvas, Lithuania. His family moved to South Africa in 1928 and he grew up there. He entered Durban High School and then the University of Witwatersrand in Johannesburg, taking the pre-medical course. However, he turned to general science (chemistry, physics and mathematics) and then he did a master degree in physics research at the University of Cape Town. In 1949, he became a PhD student at Trinity College, Cambridge, and began his research at the Cavendish Laboratory, working on a theoretical problem in the study of steel. After completing his PhD, he spent a year in the Colloid Science department in Cambridge. By 1954, he had accepted a job at Birkbeck College, London, where he worked in virus research.

In 1962 Klug moved to the newly built MRC Laboratory of Molecular Biology in Cambridge, continuing his virus research specialising in spherical viruses. The MRC Laboratory, under the leadership of Perutz, was to house the original unit from the Cavendish Laboratory (Perutz, Kendrew, Crick and, later, Brenner), and the Biochemistry Department of the University of Cambridge. It was difficult to understand the structure of viruses in 1960s. Through consistent hard work, Klug finally developed a technique called crystallographic electron microscopy and also used structural modelling to study the three-dimensional nature of poliovirus and other viruses. This new method was very efficient and it provided scientists with important information about viruses. He was awarded the Nobel Prize in Chemistry 1982, "for his development of crystallographic electron microscopy and his structural elucidation of biologically important nucleic acid-protein complexes".

Klug enjoyed teaching, as he liked interacting with young minds, but he has become less involved in teaching in recent years. He is still a Director of Studies in Natural Science at Peterhouse College, Cambridge, a position he has held for about 20 years. Klug was knighted in 1988. He married Liebe Bobrow in Cape Town, before moving to Cambridge in 1949. They have two sons.

Norman Ramsey: Nobel Prize in Physics 1989

Norman Ramsey



Norman Ramsey was born on August 27, 1915 in Washington, D.C. During his childhood, his family moved around due to his father's job duties as an army officer. He graduated from high school with distinctions at the age of 15. He entered Columbia College in 1931 and studied mathematics. After his graduation in 1935, he turned to physics and came to the Cavendish Laboratory, Cambridge, where he studied for his second bachelor degree. He was inspired by great physicists such as J.J. Thomson, Rutherford, Chadwick, Cockcroft, Eddington, and Appleton from the Cavendish Laboratory and wished to become a great physicist and inventor. Later, he returned to Columbia for his PhD and worked for Isidor Rabi in molecular beam research. For the next few years, Ramsey worked in many places, including Illinois, MIT, Columbia and Brookhaven National Laboratory, before moving to Harvard University where he worked for 40 years.

At Harvard he established a molecular beam laboratory for his molecular beam magnetic resonance experiments. After many attempts, he invented the separated oscillatory field method that allowed him to achieve the desired accuracy. In order to get improvements, he consulted with various groups that applied his method to atomic clocks. He later built a separated oscillatory field electric resonance apparatus and used it to study polar molecules. With the help of a student, Daniel Kleppner, Ramsey invented the atomic hydrogen maser, which is useful equipment for atomic research and it is used in many research centres. Ramsey received the Nobel Prize in Physics 1989, "for the invention of the separated oscillatory fields method and its use in the hydrogen maser and other atomic clocks".

In 1940 he married Elinor Jameson. After Elinor died in 1983, he married Ellie Welch. He has a combined family of seven children and six grandchildren. Ramsey officially retired from Harvard in 1986, but he still remains active in physics. After his retirement, he was a visiting researcher at the University of Colorado and a visiting professor at the University of Chicago, Williams College and the University of Michigan. He now enjoys his life as a part-time teacher, researcher and visiting professor.