# **Dr.Abdus Salam**



****Born:****29 January 1926 Jhang, Punjab Province, British India  
****Died:**** 21 November 1996 (aged 70) Oxford, England  
****Known for:**** Electroweak theoryGoldstone boson,Grand Unified TheoryHiggs mechanism,Magnetic photon,Neutral current,Pati-Salam model,Quantum mechanics,Pakistan atomic research program,Pakistan space program  
****Award:**** Smith's Prize (1950) Adams Prize (1958) Sitara-e-Pakistan (1959) Hughes Medal (1964) Atoms for Peace Prize (1968) Royal Medal (1978) Matteucci Medal (1978) Nobel Prize in Physics (1979) Nishan-e-Imtiaz (1979) Lomonosov Gold Medal (1983) Copley Medal (1990)  
****Position:**** Theoretical physics

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****Dr.Abdus Salam**** title can be described as a Pakistani theoretical physicist. He shared the 1979 Nobel Prize in Physics with Sheldon Glashow and Steven Weinberg for his contribution to the electroweak unification theory.[8] He was the first Pakistani and the first scientist from an Islamic country to receive a Nobel Prize and the second from an Islamic country to receive any Nobel Prize, after Anwar Sadat of Egypt.

## Early Life

Abdus Salam's early life was characterized by a strong emphasis on education and a remarkable academic aptitude. Born in Jhang, Punjab, on January 29, 1926, he excelled in his studies from a young age. He showed a strong affinity for mathematics and science, particularly physics. His father, a government official in the Department of Education, played a crucial role in instilling the importance of education in Salam's upbringing.

## Scientific Career

Early in his career, Salam made an important and significant contribution in quantum electrodynamics and quantum field theory, including its extension into particle and nuclear physics. In his early career in Pakistan, Salam was greatly interested in mathematical series and their relation to physics. Salam had played an influential role in the advancement of nuclear physics, but he maintained and dedicated himself to mathematics and theoretical physics and focused Pakistan to do more research in theoretical physics.[31] However, he regarded nuclear physics (nuclear fission and nuclear power) as a non-pioneering part of physics as it had already "happened". Even in Pakistan, Salam was the leading driving force in theoretical physics, with many scientists he continued to influence and encourage to keep their work on theoretical physics.  
Salam had a prolific research career in theoretical and high-energy physics. Salam had worked on theory of the neutrino . an elusive particle that was first postulated by Wolfgang Pauli in the 1930s. Salam introduced chiral symmetry in the theory of neutrinos. Salam introduced the massive Higgs bosons to the theory of the Standard Model, where he later predicted the existence of proton decay. In 1963, Salam published his theoretical work on the vector meson. The paper introduced the interaction of vector meson, photon (vector electrodynamics), and the renormalisation of vector mesons' known mass after the interaction.In 1961, Salam began to work with John Clive Ward on symmetries and electroweak unification. In 1964, Salam and Ward worked on a Gauge theory for the weak and electromagnetic interaction, subsequently obtaining model. Salam was convinced that all the elementary particle interactions are actually the gauge interactions In 1968, together with Weinberg and Sheldon Glashow, Salam formulated the mathematical concept of their work. While in Imperial College, Salam, along with Glashow and Jeffrey Goldstone, mathematically proved the Goldstone's theorem, that a massless spin-zero object must appear in a theory as a result of spontaneous breaking of a continuous global symmetry.In 1967-8, Salam and Weinberg incorporated the Higgs mechanism into Glashow's discovery, giving it a modern form in electroweak theory, and thus theorised half of the Standard Model.In 1968, together with Weinberg and Sheldon Glashow, Salam finally formulated the mathematical concept of their work.  
In 1966, Salam carried out pioneering work on a hypothetical particle. Salam showed the possible electromagnetic interaction between the Magnetic monopole and the C-violation, thus he formulated the magnetic photon. Following the publication of PRL Symmetry Breaking papers in 1964, Steven Weinberg and Salam were the first to apply the Higgs mechanism to electroweak symmetry breaking. Salam provided a mathematical postulation for the interaction between the Higgs boson and the electroweak symmetry theory. In 1972, Salam began to work with Indian-American theoretical physicist Jogesh Pati. Pati wrote to Salam several times expressing interest to work under Salam's direction, in response to which Salam eventually invited Pati to the ICTP seminar in Pakistan.  
Physicists had believed that there were four fundamental forces of nature: the gravitational force, the strong and weak nuclear forces, and the electromagnetic force. Salam had worked on the unification of these forces from 1959 with Glashow and Weinberg. While at Imperial College London, Salam successfully showed that weak nuclear forces are not really different from electromagnetic forces, and two could inter-convert. Salam provided a theory that shows the unification of two fundamental forces of nature, weak nuclear forces and the electromagnetic forces, one into another.[51] Glashow had also formulated the same work, and the theory was combined in 1966. In 1967, Salam proved the electroweak unification theory mathematically, and finally published the papers. For this achievement, Salam, Glashow, and Weinberg were awarded the Nobel Prize in Physics in 1979.

## Dr.Abdus Salam Space Program

Pakistan was among the first 10 countries to start a space programme. Its space programme started upon the appointment of Dr. Abdus Salam (Noble Prize Winner) as the Chairman of the Space Upper Atmosphere Research Commission (SUPARCO) in 1961. Salam approached President Khan to lay the foundations of Pakistan's first executive agency to co-ordinate space research.By executive order on 16 September 1961 the Space and Upper Atmosphere Research Commission (SUPARCO) was established with Salam founding director.Salam immediately travelled to the United States, where he signed a space co-operation agreement with the US Government. In November 1961, NASA built the Flight Test Center in Balochistan Province. During this time, Salam visited the Pakistan Air Force Academy where he met with Air Commodore (Brigadier-General) Wladyslaw Turowicz,a Polish military scientist and an aerospace engineer. Turowicz was made the first technical director of the space centre, and a programme of rocket testing ensued. In 1964, while in the US Salam visited the Oak Ridge National Laboratory, and met with nuclear engineers Salim Mehmud and Tariq Mustafa. Salam signed another agreement with the NASA which launched a programme to provide training to Pakistan's scientists and engineers.Both nuclear engineers returned to Pakistan and were inducted into SUPARCO.

## Nuclear weapons programme

Salam knew the importance of nuclear technology in Pakistan, for civilian and peaceful purposes. But, according to his biographers, Salam played an ambiguous role in Pakistan's own atomic bomb project. As late as the 1960s, Salam made an unsuccessful proposal for the establishment of a nuclear fuel reprocessing plant, but it was deferred on economic grounds by Ayub Khan. According to Rehman, Salam's influence in nuclear development was diminished as late as 1974, and he became critical of Bhutto's control over science. But Salam personally did not terminate his connection with the scientists working in the theoretical physics division at PAEC.As early as 1972–73, he had been a great advocate for the atomic bomb project, but subsequently took a stance against it after he fell out with Bhutto over the Second Amendment to the Constitution of Pakistan which declared the Ahmaddiya denomination to be non-Islamic. In 1965, Salam led the establishing of the nuclear research institute ,PINSTECH.In 1965, the plutonium Pakistan Atomic Research Reactor (PARR-I) went critical under Salams' leadership.In 1973, Salam proposed the idea of establishing an annual college to promote scientific activities in the country to the Chairman of PAEC, Munir Khan, who accepted and fully supported the idea. This led to the establishment of the International Nathiagali Summer College on Physics and Contemporary Needs (INSC)  
On 20 January 1972, Salam, as Science Advisor to the President of Pakistan, managed and participated in a secret meeting of nuclear scientists with former Prime Minister, Zulfikar Ali Bhutto, in Multan, known as the 'Multan Meeting'. At this meeting Bhutto orchestrated the development of a deterrence programme. Salam and appointed Munir Khan as Chairman of PAEC, and head of the atomic bomb program, as Salam had supported Khan. A few months after the meeting, Salam, Khan, and Riazuddin, met with Bhutto in his residence where the scientists briefed him about the nuclear weapons program. Salam immediately started to motivate and invite scientists to begin work with PAEC in the development of fission weapons.  
In March 1974, Salam and Khan also established the Wah Group Scientist that was charged with manufacturing materials, explosive lenses and triggering mechanism development of the weapon. Salam remained associated with the nuclear weapons programme until mid-1974, when he left the country after Ahmadi were declared non-Muslims by the Pakistani Parliament. In spite of this, Salam maintained close relations with the theoretical physics division at PAEC who kept him informed about the status of the calculations needed to calculate the performance of the atomic bomb, according to Norman Dombey.

## Death

Abdus Salam died on 21 November 1996 at the age of 70 in Oxford, England, from progressive supranuclear palsy. His body was returned to Pakistan and kept in Darul Ziafat, where some 13,000 men and women visited to pay their last respects. Approximately 30,000 people attended his funeral prayers.Salam was buried in Bahishti Maqbara, a cemetery established by the Ahmadiyya Community at Rabwah, Punjab, Pakistan, next to his parents' graves.

## Legacy

Salam's work in Pakistan has been far reaching and regarded as highly influential. He is remembered by his peers and students as the "father of Pakistan's school of Theoretical Physics" as well as Pakistan's science. Salam was a charismatic and iconic figure, a symbol among them of what they were working or researching toward in their fields.He is best known for his work on electroweak theory, which helped unify the electromagnetic and weak forces, and for his founding of the International Centre for Theoretical Physics (ICTP) in Trieste, Italy.  
****Nobel Prize in Physics (1979)****Salam shared the Nobel Prize in Physics with Steven Weinberg and Sheldon Glashow for their work on electroweak unification, which predicted the existence of certain fundamental particles.  
However, Salam's legacy is often ignored in the Pakistani education system despite his achievements. According to the documentary 'Salam: The First Nobel Laureate,' very few young Pakistanis have heard of him, and his name is not mentioned in Pakistani school textbooks.In 2020, a group of students belonging to the State Youth Parliament desecrated an image of Salam that was present at a college in Gujranwala, while chanting slogans against the Ahmadiyya community. This deliberate effort to stifle mention of Salam is attributed to Salam belonging to the Ahmadiyya Muslim community, who have faced state-sponsored discrimination since the 1970s.

## Famous QuInstitutes named after Abdus Salam and other named entities

\*Abdus Salam Centre for Physics (Department of Physics), Quaid-e-Azam University, Islamabad, Pakistan.  
\*Abdus Salam National Centre for Mathematics (ASNCM), Government College University, Lahore, Pakistan.  
\*Abdus Salam Chair in Physics (ASCP), Government College University, Lahore, Pakistan.  
\*Abdus Salam International Centre for Theoretical Physics, Trieste, Italy.  
\*Abdus Salam School of Mathematical Sciences, Lahore, Pakistan.  
\*The Edward Bouchet Abdus Salam Institute (EBASI)  
\*Abdus Salam Library at Imperial College Londonotes.

*“Scientific thought and its creation is the common and shared heritage of mankind.”*