# Homi.J.Bhabha

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- Homi Jehangir Bhabha, born in 1909 was a **nuclear physicist** who made important **contributions to quantum theory and cosmic radiation.**
- Initially Bhabha attended Cathedral School and he then enrolled for studies at Elphinstone College at the age of fifteen.
- This was followed by further studies at the Royal Institute of Science in Bombay.
- In 1927, Bhabha began studying **mechanical engineering at Cambridge University.**
- Being **influenced by physicist Paul Dirac,** after passing the Mechanical Engineering he **began studying theoretical physics.**
- He received his **doctorate degree in nuclear physics** from the **University of Cambridge in 1934.**

**His works and achievements:**

- Bhabha's **first paper "The Absorption of Cosmic radiation"** in 1933 earned him a three year Isaac Newton Studentship in 1934.
- He **worked alongside Neil Bohr** in Copenhagen in addition to his research work at Cambridge.
- He performed the first calculation to determine the **cross section of electron-positron scattering in 1935.**
- **He along with Walter Heitler in 1936** made a breakthrough in the cosmic radiation's understanding by working on the **cascade theory of electron showers.**
- With the outbreak of the Second World War in 1939, Bhabha returned to India accepting a position of reader of physics and **establishing the Cosmic Ray Research Institute at the Indian Institute of Science** (IISC) in Bangalore.

- In 1941, he was elected **Fellow of the Royal Society**.
- He established the **Tata Institute of Fundamental Research (TIFR) in Mumbai,** becoming its director in 1945.
- He became the **first chairperson of India's Atomic Energy Commission** in 1948.
- The Atomic Energy Establishment Trombay (AEET) of which he was the founding director (**now named the Bhabha Atomic Research Centre)** started functioning in 1954.
- The same year the Department of Atomic Energy (DAE) was also established.
- In the 1950s, he represented India in IAEA conferences and **led the first UN Conference held for the purpose of Peaceful Uses of Atomic Energy in Geneva, 1955.**
- It was under his direction that the scientists of India made their way into making an atomic bomb and the first atomic reactor was operated in Mumbai in 1956.
- He was **elected a Foreign Honorary Member of the American Academy of Arts and Sciences** in 1958.
- He promoted nuclear energy control and prohibition of atomic bombs worldwide.
- He is known as the "**Father of the Indian nuclear programme".**
- He served as a **scientific advisor** to Prime Ministers Nehru and Lal Bahadur Shastri.
- He gained international prominence after deriving a correct expression for the **probability of scattering positrons by electrons.**
- His major contribution included his work on **Compton scattering, R-process**, the furthermore advancement of nuclear physics.
- In January 1966, Bhabha died in a plane crash near Mont Blanc, Switzerland.

*Three-stage nuclear power programme:*

- In 1948, Nehru led the appointment of Bhabha as the

director of the nuclear programme of India.

- He **formulated a strategy of focussing on extracting power from the country's vast thorium reserves** rather than its meagre uranium reserves.
- As Thorium itself is not a fissile material, it cannot undergo fission to produce energy.
- Hence it must be transmuted to uranium-233 in a reactor fueled by other fissile materials.
- The **first two stages of the programme involves** the natural uranium-fueled heavy water reactors and plutonium-fueled fast breeder reactors to generate sufficient fissile material from India's limited uranium resources.
- In the **third stage** the thorium reserves can be fully utilised in thermal breeder reactors.
- In November 1954, Bhabha presented the three-stage plan for national development, at the **conference on "Development of Atomic Energy for Peaceful Purposes".**
- Four years later in 1958, the Indian government formally adopted the three-stage plan.

This **thorium focused strategy was in marked contrast to all other countries** in the world. The approach proposed by Bhabha to achieve this strategic objective became **India's official three stage nuclear power programme.**

**Honours:**

- He was an associate of various societies of science including the American National Academy of Sciences.
- Bhabha was awarded the Adams Prize in 1942.
- He was awarded **Padma Bhushan** in 1954.
- He was also **nominated for the Nobel Prize for Physics** in 1951 and 1953–1956.
- In quantum physics, the cross section of electron-positron scattering has been renamed "**Bhabha scattering**" in his honor.