Satyendra Nath Bose

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In news : 136th birth anniversary of S N Bose was celebrated on 1st january

A brief note on Satyendra Nath Bose(1894-1974)

Early life

- SN Bose was an Indian mathematician and physicist specialising in theoretical physics
- He was born on 1st January 1894 n a Bengali Kayastha family in Calcutta
- His father, Surendra Nath Bose, worked in the engineering department of the East India Railway Company

His Career & research

- Instead of opting for a Ph.D, Bose decided to join the Calcutta University as a research scholar in 1916.
- He took up studies in the theory of relativity and served as a physics lecturer. Along with Saha, he wrote many papers on theoretical physics and pure mathematics
- The next year, his first paper on quantum statistics was published in the Philosophical Magazine.
- In 1921, he joined the Dhaka University's physics department as a Reader. Three years later, he wrote a paper on Planck's quantum radiation law which was seminal in creating the field of quantum statistics.
- The publication led to recognition and Bose got an opportunity to work in Europe for two years at X-ray and crystallography laboratories, where he worked alongside Einstein and Marie Curie, among other renowned scientists of the time.
- After teaching at the Dhaka University for almost 25 years, where he was also the Dean of the Faculty of Science, Bose returned to Calcutta University in 1945

and taught there till retirement in 1956.

Achievements & Honours

- He was appointed as the president of the National Institute of Sciences (1949), and served as Rajya Sabha member for six years, from 1952 to 1958.
- In 1954, he was awarded the Padma Vibhushan for his contributions to the sciences and became Fellow of the Royal Society four years later.
- He was also appointed as the vice-chancellor of Visva-Bharati University. Bose received the country's highest honour for a scholar, the title of India's National Professor in 1959
- Boson, a class of elementary subatomic particles, was named after Bose to commemorate his contributions to physics. Physicist Paul Dirac coined the term 'boson' for particles that obey Bose-Einstein statistics.
- The government of India also established the S.N. Bose National Centre for Basic Sciences(Kolkata) in 1986.
- He was described as the Father of the 'God Particle' in a 2012 New York Times report

His contributions

- Bose's numerous scientific papers (published from 1918 to 1956) contributed to statistical mechanics, the electromagnetic properties of the ionosphere, the theories of X-ray crystallography and thermoluminescence, and unified field theory.
- This iconic scientist is best known for his **1924 paper in which he derived theoretical physicist Max Planck's law for black body radiation** without reference to classical electrodynamics, which resulted in the Bose-Einstein system of quantum mechanics.
- When Bose's article on Planck's law was not accepted for publication, he sent it directly to Einstein, who recognised its importance, translated it to German and

got it published on behalf of Bose, in a science journal.

- Bose's Planck's Law and the Hypothesis of Light Quanta (1924) led Einstein to seek him out for collaboration.
- Bose's interpretation is now called **Bose–Einstein statistics.** This result derived by Bose laid the foundation of quantum statistics, and especially the revolutionary new philosophical conception of the indistinguishability of particles, as acknowledged by Einstein and Dirac

- The class of particles that obey Bose–Einstein statistics, bosons, was named after Bose by Paul Dirac

Bose–Einstein condensate(BEC)

Bose–Einstein condensate, a state of matter in which separate atoms or subatomic particles, cooled to near absolute zero , coalesce into a single quantum mechanical entity—that is, one that can be described by a wave function—on a near-macroscopic scale. This form of matter was predicted in 1924 by Albert Einstein on the basis of the quantum formulations of the Indian physicist Satyendra Nath Bose.

BEC theory traces back to 1924, when Bose considered how groups of photons behave. Photons belong to one of the two great classes of elementary or submicroscopic particles defined by whether their quantum spin is a nonnegative integer (0, 1, 2, …) or an odd half integer (1/2, 3/2, …). The former type, called bosons, includes photons, whose spin is 1. The latter type, called fermions, includes electrons, whose spin is 1/2.