

Nobel Prize Case Study: Satyendra Nath Bose

Satyendra Nath Bose was a 20th century theoretical physicist who made significant contributions to the statistical foundations of *quantum mechanics*. In 1924, Bose authored the “fourth and last of the revolutionary papers of the old quantum theory,” in which he derived Planck’s law in a revolutionary way.¹ With little success publishing his paper, he sent it directly to Einstein and asked him to translate it for *Zeitschrift für Physik*, a prestigious physics journal.



Satyendra Nath Bose, observing a photo of Albert Einstein

Einstein was impressed by Bose’s work, and they continued to collaborate. Their partnership resulted in new physical theories, including *Bose-Einstein statistics* and the *Bose-Einstein condensate*. Several Nobel Prizes were later awarded for work related to the *boson*, the force-carrying particles named after Bose himself, including as recently as the 2001 Nobel Prize in physics, awarded for “the achievement of *Bose-Einstein condensation* in dilute gases of alkali atoms, and for early fundamental studies of the properties of the condensates”² and the 2013 Prize “for the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles,” namely, the *Higgs Boson*. Despite these recent dedications, and the fact that Bose was nominated 4 times for the prize, he was never awarded the honor.

Read the following quotes and answer the Discussion Questions below:

“SN Bose’s work on particle statistics (c. 1922) which ... opened the door to new ideas on statistics of microsystems that obey the rules of quantum theory, was one of the top ten achievements of 20th century Indian science and could be considered in the Nobel Prize class.” – physicist Jayant Narlikar, *The Scientific Edge*, 127.

“It is unfortunate that pioneering Indian physicist Satyendra Nath Bose did not win the Nobel Prize for work on quantum physics in the 1920s that provided the foundation of the Bose-Einstein statistics and the theory of the Bose-Einstein condensate.” – Rolf-Dieter Heuer, former director general of CERN

Discussion Questions

- (1) How many times was Santyendra Nath Bose nominated for the Nobel Prize in physics? _____
- (2) Summarize two arguments for why Santyendra Nath Bose should have been awarded a Nobel Prize.
- (3) Summarize one argument that could explain why Santyendra Nath Bose did not receive a Nobel Prize.
- (4) When Bose was asked about his omission from the Nobel Prize, he responded: “I have got all the recognition I deserve.” What do you think this implies about Bose’s opinion of the Nobel Prize?

¹ Wali, “The man behind Bose statistics,” 46.

² “The Nobel Prize in Physics 2001.”