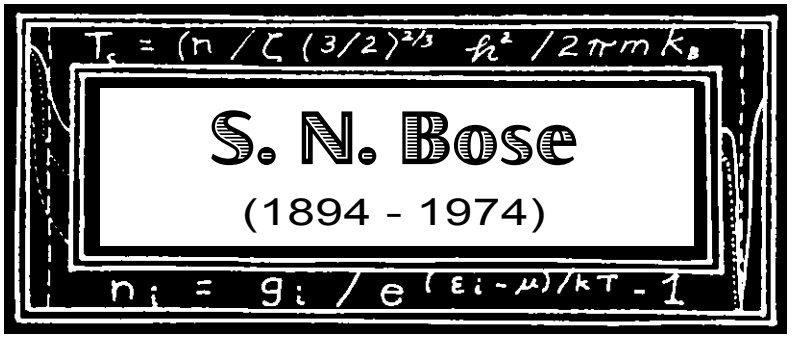
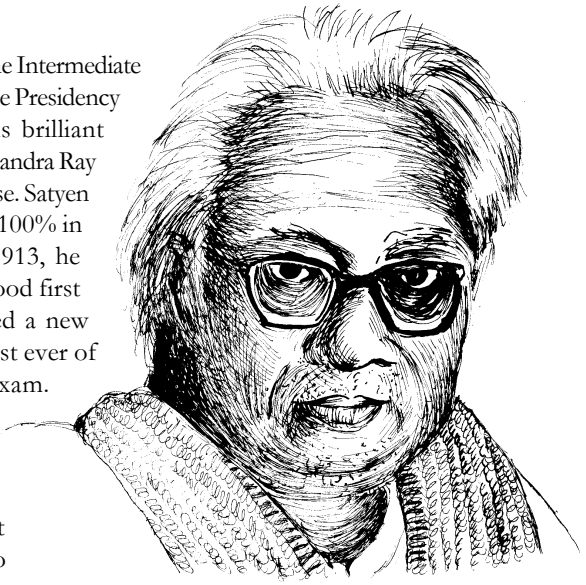


Though India has many scientists, it woefully lacks many great scientists. S. N. Bose was one such legend. He collaborated with Einstein and a class of microscopic particles known as *Bosons* carry his name.

Satyendra Nath Bose was born on 1 January, 1894 in Calcutta. His father Surendra Nath was an accountant in the railways. Bose initially went to the same school where Rabindra Nath Tagore studied for a short period. Later Satyen went to the Hindu School where his teacher Upendra Bakshi gave him 110 out of 100 marks in the mathematics exam because he showed several ways of solving the same problem in the given time!



After school Satyen cleared the Intermediate Entrance Exam and joined the Presidency College, Calcutta. Here his brilliant teachers included Prafulla Chandra Ray and Sir Jagadish Chandra Bose. Satyen was very bright and scored 100% in the Physiology exam. In 1913, he passed BSc honours and stood first in the merit list. He created a new record by scoring the highest ever of 92% marks in the MSc exam. Bose's classmate Meghnad Saha stood second on both occasions.

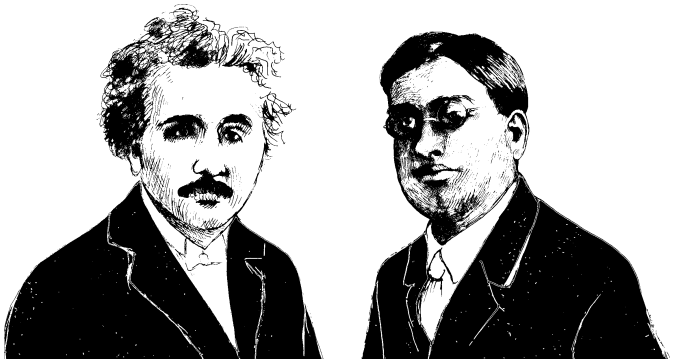
In 1914, while still a student Bose was married to

Ushabati, the daughter of a medical practitioner. In 1916 Bose was appointed Lecturer in the University College of Science. His colleague in the Physics Department was his friendly rival Meghnad Saha. Both were mathematically-oriented young men who, by their own self-study had gained proficiency in physics.

Bose published his first research paper on *The Influence of the Finite Volume of Molecules on the Equation of State* in the *Philosophical Magazine* of London in 1918. His next two papers were purely mathematical in nature.

In collaboration with Saha, Bose translated Albert Einstein's paper on the *Theory of General Relativity* from the original German into English. The British publisher objected to the translation but Einstein graciously gave his permission to these young Indian scientists.

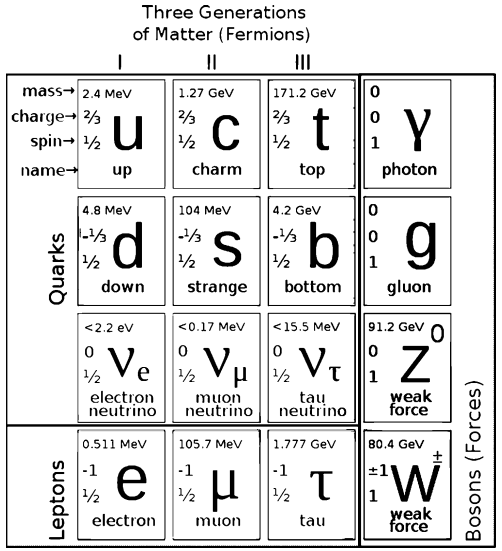
In 1921 a new university was being formed in Dacca and its administrators, eager to attract a talented faculty invited Bose as a Reader. The facilities were primitive but Bose made up for the bad facilities at Dacca with his enthusiasm. Ever the perfectionist, he was dissatisfied with Max Planck's ways of deriving



some of his equations and produced a brilliant paper, *Planck's Law and Light Quantum Hypothesis* in which he worked out a rigorous derivation.

As no journal was willing to publish his paper so in 1924, Bose just thirty years old hesitantly sent it for comments to the celebrated Albert Einstein. So impressed was Einstein with Bose's paper, that he personally translated it into German and got it published in the German journal of science *Zeitschrift fur Physik*. Can any young physicist hope for a greater honour than this?

The collaboration between Bose and Einstein ultimately resulted in the well-known Bose-Einstein statistics used in quantum mechanics. Subatomic particles which obey Bose-Einstein statistics came to be known as *BOSONS* after Bose. Unlike other kinds of sub-atomic particles, an unlimited number of bosons may occupy the same state at the same time. Bosons tend to congregate together at the same lowest energy state, forming a *Bose-Einstein* condensate.



Bose undertook a study tour of Europe in October 1924. He spent a year in France, working for a while in the laboratory of the famed Madame Curie. He spent one more year in Germany where apart from Einstein he interacted with other famous scientists - Lise Meitner, Otto Hahn, Wolfgang Pauli and Heisenberg. Berlin at that time was the science capital of the world. He learnt a lot in Berlin which he put to good use at Dacca. Bose built experimental facilities at Dacca and encouraged students to use them. This attracted good researchers like K.S. Krishnan who did seminal work on magnetic anisotropies and later published a number of papers.

The time Bose spent in Dacca was perhaps the happiest period of his career. However, he felt pained by the rising communal tensions. So after partition in 1947 he readily accepted the Khaira Chair at the University of Calcutta.

Professor P. A. M. Dirac had come to Calcutta along with his wife in the mid-fifties. They were sharing the same car with Bose. Bose let them have the back seat. The front seat, which Bose occupied along with the driver, did not have much room; nevertheless Bose asked some of his students to get in. Dirac, a little surprised, asked if it wasn't too crowded. Bose looked back and said in his disarming fashion, *"We believe in Bose statistics,"* Dirac explained to his wife, *"In Bose statistics things crowd together."*

Research grants in universities were ridiculously low in those days. For example Bose and other professors were allowed Rs. 2,500/- per year! Nevertheless, Calcutta University gained fame as an active and creative research centre in India. Drive and determination compensated for paucity of resources.

Bose's laboratory became a centre for excellence in X-ray crystallographic studies. He was made the President of the Indian Physical Society for the period 1945-1948. Subsequently he was awarded the Padma Vibhushan in 1954 and in 1958 elected a Fellow of the Royal Society of London. Bose's last significant scientific contribution was towards the evolution of a *Unified Field Theory*, which tried to combine electromagnetic forces and gravitational forces. But success still continues to elude the scientific community.

In 1956, Bose became the Vice Chancellor of Visvabharati, better known as Shanti Niketan, forever associated with the memory of Rabindra Nath Tagore. The ideal of the institution to achieve a synthesis between Science and Spiritualism, between the ancient East and Modern West was naturally what attracted Bose. With his natural friendliness he also had no difficulty in getting on well with everybody. But administration was not his forte and his reforms evoked fierce resistance. So he was relieved to return back to Calcutta University in 1959.

Bose was a complex character, not easily classified. As a brilliant mathematician he wrote only 25 papers – an appallingly meagre output! The entire field of knowledge was his province. He worked in as diverse fields as chemistry, mineralogy, biology, soil science, philosophy, archaeology, the fine arts, literature and languages. He was extremely fond of instrumental music and played the *esraj* like a maestro. He often discussed mural paintings with Jamini Roy. Tagore dedicated his book *Viswa Parichay* (Introduction to the Universe) to Bose. He was keenly interested in popularizing science in the vernacular and inspired the setting up of *Bangiya Bijnan Parishad* which started the publishing of *Jnan O Bijnan* (Knowledge and Science) a popular science magazine in Bangla. He strongly believed that higher level scientific thinking was possible only in the mother tongue. He abhorred protocols and anybody could meet him without any appointment. He spent hours conversing with his friends and never considered it a waste of time.