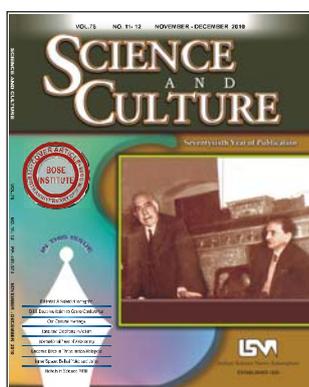


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EDITORIAL

D. M. BOSE: A SCIENTIST INCOGNITO



D. M. Bose (b.1885) was an exceptional physicist, like his colleagues and contemporary scientists like C. V. Raman (b.1888), S. K. Mitra (b.1890), M. N. Saha (b.1893) and S. N. Bose (b.1894). While he shared comparable international and national reputation in his lifetime, the life and works of Bose and (to a lesser extent Mitra) are less discussed and known to people today. The cover article in this issue depicting Bose's scientific contributions is a tribute to this great thinker and scientist on behalf of the Indian Science News Association (ISNA) and Bose Institute. D.M. Bose was the longest serving Director (1938-1967) of Bose Institute and was associated with ISNA since 1944 in various capacities as its President, Vice-President and Secretary. We recall with pride that he steered the journal *Science and Culture* as its editor for about twentyfive years until his demise in 1975.

The purpose of this editorial is twofold: to focus on aspects of D.M. Bose's life which are immensely significant yet almost unknown to the scientific community, and secondly, attempt to understand why, despite Bose's scientific recognition and reputation in India and abroad, he has not been a public figure. This author is of the opinion that Bose's discoveries and his contribution towards national planning of scientific and technological developments of this country are not fully known even to physicists.

After getting his M.A. degree from Presidency College in 1906, Bose joined Christ's College at Cambridge in 1907 for higher studies and worked with Sir J. J. Thomson and C. T. R. Wilson at the Cavendish Laboratory, and obtained

a B.Sc. degree with Honours in Physics from the Royal College of Science in 1912. After his return to India in 1913, he joined the City College in Calcutta as a Lecturer in Physics for a brief period. He was invited to join the newly founded Calcutta University Science College as Rashbehari Ghosh Professor of Physics in 1914, a position he continued to hold till 1935. In 1914 he joined Humboldt University in Berlin for higher studies. After his 'enforced' five years' stay in Berlin he returned to India in 1919 with Ph.D. degree in Physics and resumed his position of Rashbehari Ghosh Professor. He became Palit Professor of Physics at Calcutta University in 1935, the position vacated by Sir C.V. Raman, and joined Bose Institute as its Director in 1938 after the demise of his maternal uncle and founder, Sir Jagadis Chandra Bose.

During his work in England and Germany, D.M. Bose came in contact with many world-class physicists of that time like Max Planck, Albert Einstein, Peter Debye, Walther Nernst, Heinrich Hertz and Max Born. This, along with his significant research work using cloud chamber and magnetism in India and abroad, had established him a name as an internationally reputed physicist. He attended the Como conference, held during 11-20 September 1927 at Lake Como in Italy, with sixty invited participants from fourteen countries including eleven Nobel laureates. This conference was known to be a 'meeting of exceptional interest' in commemoration of the first centenary of the death of Alessandro Volta. It is to be noted that only two Indian scientists, D.M. Bose and M.N. Saha, participated in this meeting (see the cover story for more details).

It is interesting to note here that S. N. Bose was attracted to Planck's hypothesis by reading the two books of Planck, *Thermodynamik* and *Warmestrahlung* (unavailable in India then), that D. M. Bose had given him to read. S. N. Bose noted the inner inconsistency of Planck's exposition and according to D. M. Bose, this "dissatisfaction with Planck's deduction of radiation

formula led to [S. N.] Bose's deduction on a combinatorial basis of Planck's formula in 1925." This is but one of the instances of D.M. Bose interacting with and encouraging junior colleagues at Calcutta University to progress in research. D. M. Bose was appointed as an examiner of Griffith Memorial Prize in 1920 in which candidates had to submit essays incognito. Bose recollected the following: "I came across amongst the other papers one by 'Heliophilus' [*nom-de-plume* of M. N. Saha] on 'Origins of Lines in Stellar Spectra'. As the paper was so outstanding compared to other essays submitted for the prize, there was no hesitation in recommending it."

Many are unaware of Bose's involvement in the national planning of science and technology in India. Vigorous activities for India's scientific and technological development started around 1940. The Council of Scientific and Industrial Research (CSIR), constituted in 1942, made plans to build the National Physical Laboratory (NPL) and the National Chemical Laboratory (NCL). A

Planning Committee was formed in 1943 towards this goal, and D. M. Bose, along with K. S. Krishnan, M. N. Saha and S. Bhatnagar, were the committee members. However, M. N. Saha resigned due to difference in opinion about the chairmanship of the committee and the location of NPL which M.N. Saha desired to be in Calcutta. Bose did not attend a single meeting of the Committee, possibly in solidarity to the causes raised by his colleague Saha. When the Atomic Energy Committee (AEC) was formed in 1945 as a sub-committee of the CSIR, Bose was inducted in the committee as an expert on nuclear chemistry, along with S. Bhatnagar, Nazir Ahmed, M. N. Saha, K. S. Krishnan and D. N. Wadia. In 1946 AEC sanctioned a capital and recurring grants to D.M. Bose for research on trans-uranic elements at Bose Institute, and this was supplemented by research funds received by Bose in 1947 to study the separation of U-235 from uranium oxide (U_3O_8) imported from Canada. This intimate relationship between D.M. Bose and the Atomic Energy Committee (later changed to Atomic Energy Commission) continued for many years into independent India.

As evident from above, D. M. Bose was not only a pioneer of nuclear physics and cosmic ray research in India, but also made a significant contribution towards the country's atomic energy programme. However, less is known about the work of D.M. Bose and Bibha Choudhuri,

who missed the Nobel Prize for discovering the mu-meson, for lack of access to modern scientific tools. There is an interesting story related to this investigation. In the Science Congress session in 1938, Taylor and Bothe discussed the investigation on the tracks of ionizing particles recorded in photographic plates and this discussion led D.M. Bose to study cosmic rays using photographic plates. In a series of articles published in *Nature* they identified a cosmic particle having an average mass close to 200 times the mass of electron (later known as mu-meson), by exposing Ilford half-tone photographic plates to cosmic rays during 1939-1942 in Darjeeling. Unfortunately, due to World War II restrictions, full tone photographic plates

were not available in India at that time. However, C. F. Powell independently used the exact same method for determining mass of mesons (found to be 216 times the mass of electron) but with improved full-tone photographic emulsion plates. In recognition of this pursuit, Powell was awarded the Nobel Prize in 1950 "for his development of the

photographic method of studying nuclear processes and his discoveries regarding mesons made with this method." Powell, to his credit, admitted in his book, *The Study of Elementary Particles by the Photographic Method*, that the method developed by Bose and Choudhuri in 1941 on distinguishing between tracks of proton and meson in an emulsion was indeed the first attempt, and commented that "the physical basis of their method was correct and their work represent the first approach to the scattering method of determining momenta of charged particles by observation of their tracks in emulsion."

It is a natural question why D. M. Bose is not more known in the Indian scientific community, despite his international stature, scientific achievements (summarized in the cover article) and being the nephew of famous Acharya Jagadis Chandra Bose. His contemporary, C.V. Raman, being the sole Nobel laureate in science from India had obvious reasons to be a familiar name in India. Another colleague, M. N. Saha, was the only one among his contemporaries who was actively involved in socio-political movements of the country, and his proximity to powerful political and scientific leaders raised awareness of his achievements among common people. (For example, M.N. Saha with Netaji Subhas Bose collected about Rs. 23 lakhs for flood relief in Bengal in 1922-23 under the direction of Acharya P.C. Ray. He also campaigned for Subhas Bose towards his election as the Congress

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President. He established ISNA in Calcutta, National Science Academy in Allahabad and published powerful editorials in *Science and Culture* on issues related to overall development of the nation. He also contested Parliamentary election in 1952 and was elected a Member of Parliament. His active participation and powerful deliberations in Parliament, sometimes criticizing Nehru, are well known.) Another contemporary, S. N. Bose, was also appointed Rajya Sabha Member in 1952, but it was the association of his name with Einstein in their epoch-making work that helped him gain fame.

It is a fact of life that fame and popularity percolate incredibly slowly among Indian society for scientific achievements, compared to fields like cricket and cinema.

Sometimes the christening of institutes and streets help the process of familiarization. For instance, M. N. Saha and S. K. Mitra established two separate institutes in the premises of Calcutta University Science College campus: Institute of Nuclear Physics (later renamed Saha Institute of Nuclear Physics after Saha's death) and Institute of Radiophysics and Electronics by Mitra. An institute named after S. N. Bose was established in Kolkata after about twelve years of Bose's death, and C. V. Raman also

established his own institute in Bangalore. However, D. M. Bose has no institute or laboratory named after him.

The present author joined Bose Institute when D. M. Bose was the Director of the institute and is one of the very few candidates who was interviewed by him and recommended to join as research scholar. From a very limited interaction with him and plentiful observations from a distance, I am of the opinion that in spite of his exceptional scientific achievements and significant contributions to the development of science and technology in India, Bose shied away from publicity, preferring to keep himself absorbed in studies and research. Although he was a storehouse of knowledge, his works did not get as much publicity because of his

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To the best knowledge of this author, no complete biography of D. M. Bose exists in the form of a published book, mini-biographies published ritually on various occasions excepted. Bose Institute can take on itself the noble programme of publishing a biography of D. M. Bose, leveraging on the personal information and anecdotes from some of his students and colleagues who are still alive. □

S. C. Roy

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