



Conference Report

Report of the Seminar on “Iconic Scientific Personalities: Prof. S N Bose, Prof. M N Saha and Prof. P C Mahalanobis”

On 29th September, 2018, Institute of Science, Education and Culture (ISEC), in collaboration with Birla Industrial and Technological Museum (BITM), organized a seminar on “Iconic Scientific Personalities: Prof. S N Bose, Prof. M N Saha and Prof. P C Mahalanobis” at the Seminar Hall, BITM as a tribute to pay homage to the three great scientists on the occasion of their 125th birth anniversary. That great occasion started with an Inaugural Speech by Prof. Anil Kumar Ghosh, the President of ISEC.

After the Inaugural Session, the Technical Session I was started. Prof. P. K. Mukherjee, Retired Professor from Indian Association for the Cultivation of Science (IACS), Kolkata, was the Chairperson of this session. Eminent Professor, Prof. Bikash Chandra Sinha, Former Homi Bhabha Professor of the Department of Atomic Energy, Former Director of SINP, Kolkata, VECC, Kolkata and Tagore Centre for Natural Science and Philosophy, delivered a very inspiring lecture on “Professor Satyendra Nath Bose, A Legend in His Life Time”. He uttered an interesting quotation of Prof. S. N. Bose (who was born on 01/01/1894 in Calcutta) that says, “One culture helps another culture to flourish”. In 1894, Satyendranath was born, and most of the Bengalees in that period were involved in renaissance that might be in cultural, in scientific or in political matters. Few years after Bose’s birth, Prof. J. C. Bose demonstrated the propagation of mm waves. From childhood, Satyendranath was a sophisticated urban milieu and he had a deep bondage with art, music and literature. For this reason, he was called an icon in the literary and musical circuit. Apart from

Bengali and English, Bose also knew French and German. By heart, he was a mathematician with a tremendous insight to physical sciences including Chemistry. In spite of his academics, he also kept close company with poet Jishnu De, painter Jamini Roy, poet Sudhin Dutta. The three legendaries, M. N. Saha, P. C. Mahalanobis and S. N. Bose, the students of Acharya Jagadish Chandra Bose in Presidency College and Science College were the hub of the bold and the brightest. Bose scored record marks in applied mathematics. After learning German, he and M. N. Saha translated the famous paper of Einstein on General Theory of Relativity in English and the P.C. Mahalanobis wrote an introduction in a scholastic style. After that, Bose settled at Dacca University, and there he invented the fundamental and path breaking equation on rederiving Planck’s law that led to statistics of radiation, carried by photons. After rejection of the paper based on this work by the British Royal Society Journal, Philosophical Magazine, he confidently sent the same to Albert Einstein. Einstein translated that paper into German and communicated that to Zeitschrift für Physik with a very promising note. A. Einstein has applied the “Bose statistics” to ideal gas, and Bose-Einstein condensation (Bose-Einstein statistics) was discovered. “Boson” were recognised as an elementary particle. In the Seminar paper titled “Planck’s law and the Light Quantum Hypothesis” (2nd July 1924), Bose argued that “if radiation be enclosed in a total phase space volume V with its total energy E , and different types of quanta each having number N_s and energy $h\nu_s$ ($s= 0$ to ∞ ; the entire spectrum), then it seems, however,

appropriate to multiply this number once again by a factor of 2 in order to take into account the fact of polarization, so that we obtain as the number of cells belonging to frequency interval $\nu, d\nu$ ". The so-called "shot in the dark" criticism was not valid, and that was pointed out by Partha Ghose of S. N. Bose National Centre for Basic Sciences, Calcutta, 1994. He explained that Bose had used the concept of spin, one unit of intrinsic spin which could take only the values ± 1 . The spin was discovered later leading to a Nobel Prize. The second paper of Prof. S. N. Bose, entitled, "Thermal equilibrium in the radiation field in the presence of matter" was considered as his best work and that was probably translated by Einstein around 1924, published in *Zeitschrift für Physik*, with adverse comments by Einstein. As three of the most perceptive and original ideas of Bose were squashed by Einstein, S. N. Bose felt extremely disappointed. Those very unpleasant experiences had rattled him and he came back from Europe without having a single published paper. This unpleasant event from Einstein was an almost perfect example of "Eklavya" philosophy. Similar situation was happened to Prof. M. N. Saha also. In spite of a world celebrated scientist, he was a very down-to-earth person. Prof. Bikash Chandra Sinha acclaimed that without having Nobel Prize, Prof. S. N. Bose achieved much more and he would be remembered as long as the existence of human civilization. The Chairperson of this session concluded Technical Session I with a hearty thank to the speaker.

After the tea break, the Technical Session II started. The Chairperson of this session was Prof. A. Manna, Retired Professor from Physics Department, Jadavpur University. The speaker was Prof. Atri Mukhopadhyay of SNIP, Kolkata. The topic of his lecture was, "The Hurdles of Meghnad Saha". Prof. Mukhopadhyay delivered the lecture just like a story teller. It was very interesting. Prof. M. N. Saha was born on 06/10/1893 and initially his name was "Meghnad". Whenever Michale Madhusudan Dutta wrote the poetry "Meghnad Badh", Prof. Saha changed his name to "Meghnath". Prof. M. N. Saha was an Astrophysicist and is best known for the development of "Saha Ionization Equation" in

thermal ionization theory. His favourite subject was Mathematics and History. He was very fluent in English, Sanskrit and Bengali languages. He ranked third in Matriculation and took admission in Dacca University. There he learnt and sat in the examination of German language and got the 3rd prize. In spite of his intelligence and talent, he suffered from casteism and was defined to be of lower caste. M. N. Saha was very much inclined towards science. In his B.Sc.(honors) course, he ranked 2nd position while his friend and classmate S.N. Bose stood first. Sir Ashutosh Mookerjee found M. N. Saha fit to promote him to higher education and research in Science. Acharya Prafulla Chandra Ray taught him Mixed Mathematics. Both M. N. Saha and S. N. Bose joined Physics Department of Dacca University and then went to Europe in 1900 to carry out research in Classical Physics. Both had jointly started research on "Equation of State of Real Gas", and they solved "3-Macro specific Quantity" and discovered Gas Particle not to be a Point Particle.

The main problem in Astrophysics is Interpherol, i.e., "mass of the Radiating Atoms". M. N. Saha completed B.Sc. in Physics and did research in "Identifying Elements in Sky". He tried to solve his mindset question, "Why does comet bend while emit from the Sun?" From this question, he developed Photonic concept of Atoms, i.e., atoms have mass, momentum and energy, and their radiation patterns are indifferent. Prof. C. V. Raman joined in Calcutta University as the teacher of Bose and Saha. Saha acquired Ph.D. for the Spectroscopic analysis of Spectrum of Sunlight. He found that Bright lines are emitted by atom and dark lines are absorbed. Saha joined scientist Alfred, and Depending on Boltz theory, he found that, "When Atom ionized it acquires higher frequency and the spectral lines become different". Saha's Ionization theory determines how many atoms will be ionized when a certain temperature is given. In 1920, M. N. Saha wrote 4 papers in Astronomy and then went to Berlin. Prof. Asutosh Mookerjee created a professor post in Calcutta University and Dr. M. N. Saha joined there. Dr. Saha wrote "Annals of Astrophysics", developed "Saha's Theory" and "Saha's Annals Theory". In 1946, he wrote two letters to Scientist

Ralph Harry Fowler and Edward Arthur Milne to carry out his research. Russells had proved that Saha really did Saha Annals theory. Then Prof Saha did research in Madam Couries Lab (in Theory of Spectroscopy: Ionization). He was one of the prominent workers on Halley's Comet. In spite of his talent, C. V. Raman did not like him, and Saha moved to Allahabad University where had no laboratory to do research. C. V. Raman caused some troubles to M. N. Saha in Kolkata as well as in Allahabad while carrying out Nuclear Study and Research. Bhabha Atomic Research Centre also had avoided Saha because of Raman. Then he moved towards politics. Jawaharlal Nehru was stated to exploit him. However, he was very active in the planning of various projects, such as Damodar Valley project, etc. Prof. M. N. Saha was the Founder of the Institute of Nuclear Physics in Kolkata, Allahabad and New Delhi. On 16/02/1956, Prof. M. N. Saha, a Fellow of Royal Society, had breathed his last. With this, Technical Session II ended after a deep discussion between the speaker, the chairperson and the audience.

The third Technical Session was started after the lunch break. The Chairperson of this session was Dr. Purabi Mukherji of ISEC and Convener of the Seminar. The speaker was Prof. Pradipta Bandyopadhyay of ISI, Kolkata. He gave an informative lecture on "Professor Prasanta Chandra Mahalanobis: A Scientist and an Entrepreneur". He informed that ISI, Kolkata had made a recorded CD titled, "Togetherness: P. C. Mahalanobis and Rabindranath Tagore (A unique bonding)", by Sudeshna Basu and Barun Chanda. P. C. Mahalanobis, the Man of Making, was born on 29/06/1893 and that was the time of Bengal Renaissance. In 1912, after passing B.Sc. (Honours) in Physics from Presidency College, Calcutta, he left for England to study at King's College, Cambridge. In 1915, he stood first in Tripos examination, Part-I (Mathematics) and Part-II (Physics) and was awarded a Research Scholarship. Then he returned home for vacation. Meanwhile, WW-I started and he did not go back. He became Professor of Physics at Presidency College in 1922. In 1923, he married Nirmalkumari

(Rani), daughter of Heramba Chandra Maitra, Principal of City College. Just before leaving for Cambridge, he brought a set of Biometrika. Then Statistics had changed his life. From the year 1917, he started work with Statistics and was keen to use statistical methods as a tool for ascertaining truth everywhere. In 1923, his two notes on upper air varieties were published in Memoirs of Indian Meteorology Department. He was also "A Friend for Life" as he applied statistics in agricultural and flood research. In 1930, he developed D^2 statistics, known as Mahalanobis distance. He founded Indian Statistical Institute in 1931 and in 1933, he started "*Sankhyā*, the Indian Journal of Statistics". From 1934 to 1951, he did Large-Scale Sample Surveys all over India. He was asked by Jawaharlal Nehru to be the Planner For National Development. His model was focused from agriculture to industry, National Sample Survey, Statistical method of Quality Control (SQC), etc. In 1950, he started a Computer Development Unit in ISI with the First Electronic Computer. During 1962 to 1966, the first 2nd-generation computer, ISIJU-1 was built jointly by the ISI and Jadavpur University. Mahalanobis was a Scientific Ambassador. Prof. C.R. Rao declared that he was "A physicist by training, a statistician by instinct, and an economist by conviction" and "Deshikottom" P C M had become "The Father of Indian Statistics". All members expressed gratefulness to the speaker for delivering such an informative lecture about Prof. P. C. Mahalanobis and the session ended thereby. For more, see the article on P C Mahalanobis written by the speaker Prof Pradipta Bandyopadhyay (page 54-60)

After all the three sessions, an open discussion was there within the members of ISEC Family and the distinguished speakers. At last, Prof. Santanu Das, the Siksha Ratna Awardee 2018, and the Secretary of ISEC delivered a vote of thanks. (A few photographs of the seminar are in the back inside cover)

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