



SATYENDRA NATH BOSE NATIONAL CENTRE FOR BASIC SCIENCES



Newsletter

Vol. 7, Issue 2

Celebrating 125th Birth Anniversary of Satyendra Nath Bose

Editorial

We are happy to publish the second edition Newsletter 2018. The 12-page edition mainly covers the BOSE - 125 programmes - various academic and administrative events, which were held at, or organized by, the S. N. Bose National Centre (SNBNCBS) for Basic Sciences, Kolkata during January - July, 2018, to celebrate the 125th birth anniversary of legendary physicist Acharyya Satyendra Nath Bose. We also provide highlights of the other activities during the above mentioned period.



Professor Satyendra Nath Bose

News and Events (Academic)

BOSE FEST 2018

Like every year, Bose Fest 2018, the annual in-house meeting to celebrate science and culture, was celebrated this year at the S. N. Bose Centre, Kolkata during February 8 - 10, 2018 with enthusiastic participation from both academic and non-academic members of our Centre. The conveners were Dr Ramkrishna Das and Dr. Prosenjit Sing Deo. Also twelve student-volunteers actively participated and helped to organize the program successfully. The program was inaugurated in the morning of 8th February, 2018 by lighting of lamps and a motivational speech by Prof. Samit K. Ray, Director of the Centre. On the first two days, there were scientific programs consisting of about twenty talks and forty posters by the students, highlighting their interesting research works.



On 10 February, the "Alumni Day" was celebrated, for the first time at the Centre, with participation of the alumni of the S. N. Bose Centre from India and abroad. The event started with a warm welcome of the alumni, followed by an inaugural function, short talks by the alumni and releasing of a T-shirt having the logo of the S. N. Bose Centre and "BOSE-125" by the Director. On this occasion, a special talk on "Wild Life" was delivered by the eminent wildlife photographer, Mr. Sandip Dutta. As a part of the



festival, cultural programs were also arranged in the evenings of 9 and 10 February. On the 9 February evening, renowned singer Mr Surojit Chatterjee and his team performed on stage program. On the 10 evening students, faculty members and the non-academic members produced memorable performances on dance, drama, recitation and other on-stage activities. This was followed by family dinner at the lawn of the Centre. The program concluded with happiness and satisfaction all around which would reflect in all our endeavors and our relations.

Conferences/Workshops/Schools

International Symposium on New Frontiers of Quantum Correlations

The “International Symposium on New Frontiers of Quantum Correlations (ISNFQC18)”, a tribute to Professor Satyendra Nath Bose on his 125th birth anniversary, was organized during January 29 - February 2, 2018 at the S. N. Bose National Centre for Basic Sciences, Kolkata. Bose's original works formed a historical inspiration for the development of many attributes of quantum indistinguishability, and acted as a forerunner to the subsequent strides in quantum information science. Several new developments in the theoretical and experimental frontiers of quantum information were presented in the Symposium. Certain notable topics discussed were resource theories of quantum coherence, quantum thermodynamics and device independent quantum key generation. There were about forty invited talks and twenty-five contributed talks from experts all around the world. Keynote lectures included those delivered by C. H. Bennett (IBM, NY), Y. Hasegawa (Atomintitut, Vienna), D. Bruss (HHU, Duesseldorf), M. Kim (Imperial College, London), A. Streltsov (Gdansk Univ., Poland), A. K. Pati (HRI, Allahabad), C. Branciard (Institut Neel CNRS, France), S. Bose (University College, London), S. Ghosh (IMSc Chennai), G. Adesso (Univ. Nottingham, UK). Among forty posters selected for



presentation by young scientists, three were awarded prizes sponsored by Springer. The Symposium received major funding from SNBNCBS, SERB-DST, Calcutta University and ISI Kolkata

(Conveners: Archan S. Majumdar, SNBNCBS; Guruprasad Kar, ISI Kolkata; Debasis Sarkar, Calcutta University).

Emergent Phenomena in Classical and Quantum Systems

A Conference on “Emergent Phenomena in Classical and Quantum Systems (EPCQS18)” had been organized at the Center during 26 - 28th February, 2018. This conference brought together leading researchers, young scientists and research students who have been working in classical and quantum aspects of the problems across the nation. It provided a platform to discuss various problems and understand collective phenomena, in general, whose complete theoretical understanding is still lacking, in a multidisciplinary approach. Total 31 lectures were delivered and 34 posters were presented during the conference by focusing on the following topics i) Fluctuation, relaxation and transport in classical/quantum systems, ii) Nonequilibrium dynamics in systems (classical/quantum) driven far from equilibrium, iii) Thermalization and equilibration in quantum systems, iv) Phase transitions, structure and pattern formation in nonequilibrium, v) Other exotic phenomena in classical and quantum systems. Internationally reputed scientists, such as Prof. Mustansir Barma, Prof. G Baskaran, Prof. S. Ramasesha, Prof. T. V. Ramakrishnan, Prof. Gautam Menon, Prof. Satya Majumdar and many more, were present in the conference. They inspired the younger generation of researchers, belonging to different communities, to collaborate in theoretical, numerical and experimental fields of research. At the end of the conference, there was

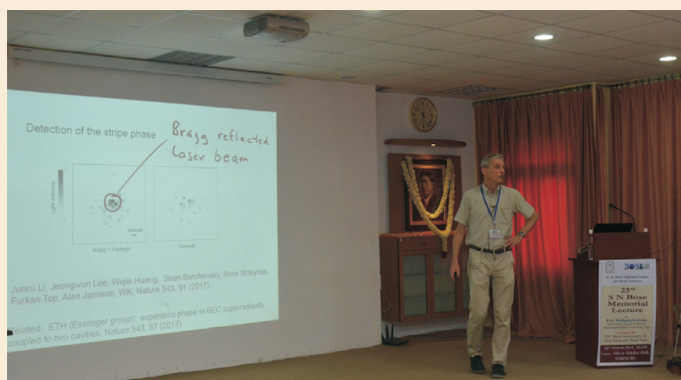


a panel discussion on important problems in statistical and condensed matter physics.

(Conveners: Manoranjan Kumar and Punyabrata Pradhan, SNBNCBS)

International Workshop on BEC and Related Phenomena (IWBECRP)

On the occasion of the 125th birth anniversary of Professor Satyendra Nath Bose, our Centre organized a three-day “International Workshop on BEC and Related Phenomena” at the S. N. Bose National Centre for Basic Sciences, Kolkata during 26 - 28 March 2018. The purpose of the event was to bring together eminent scientists, young researchers and students who have been working in various aspects of the above mentioned research areas. The main topics covered in this workshop were as follows: (i) Bose- Einstein Condensation in atomic and molecular gases, (ii) Bardeen-Cooper-Schrieffer (BCS) pairing to BEC crossover in superconductors and superfluids, (iii) Physics of cold atoms and condensation of interacting Bose gas, (iv) Feshbach resonance and spectroscopic techniques. On March 26, 2018, the Nobel Laureate Prof. Wolfgang Ketterle gave the S. N. Bose Memorial Lecture on “New forms of matter with ultra-cold atoms:



Supersolid, superradiance, and polar molecules” in this meeting. The workshop was attended by 35 students and 11 speakers.

(Conveners: Ranjan Chaudhury, Manoranjan Kumar, and Samit K. Ray, SNBNCBS)

National Summer School on Statistical Physics

To celebrate the 125-th birth anniversary year 2018 of Professor Satyendra Nath Bose, the S. N. Bose Centre, along with Saha Institute of Nuclear Physics, Jadavpur University and St. Xavier's College (autonomous) organized the “National Summer School on Statistical Physics” during 4-15 June, 2018. The aim of this school was to introduce the research topics of statistical physics to the young students of our country. A total of 94 students from the background of physics, in level of B. Sc. 3rd year, M. Sc and Ph. D., were selected to attend the school. A total of 11 renowned speakers (national as well international level) delivered 42 lectures, with several tutorial sessions, where they tried to motivate the students with highly interesting and challenging problems of statistical physics. There were also poster sessions, where selected students presented their works.

(Convener: S. S. Manna; Co-conveners: Jaydeb Chakrabarti, SNBNCBS; Pradeep Mohanty, SINP; Sanat Karmakar, Jadavpur University, Kolkata; Tapati Dutta, St. Xaviers University, Kolkata)

Workshop on Mathematica - Research, Development, Deployment & Progress

Computer Services Cell of the Center organized a “Workshop on Mathematica - Research, Development, Deployment & Progress” on June 11, 2018. The workshop was inaugurated by the Director Prof. Samit K. Ray. Around 53 participants, including faculty members and students of the Centre, joined the workshop with great enthusiasm.

(Convener: Sanjoy Choudhury, SNBNCBS)

Public / Distinguished / Memorial Lectures

Bose-125 Public Lecture by Prof. Bruce Tsurutani : A BOSE 125 distinguished public lecture, entitled "From the Sun: Solar Flares, Auroras, Magnetic Storms and the Van Allen Radiation Belts" was delivered by Prof. Bruce Tsurutani, Principal Scientist, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, NASA, USA on 28th February, 2018 at Rabindra Okakura Bhavan, Kolkata. Prof. Tsurutani joined Jet Propulsion Laboratory (JPL) at the California Institute of Technology and



remained there ever since. He is a senior research scientist at JPL and has become the principal scientist of JPL since 2001. He has overlooked the space physics and astrophysics activities when it was involved with more than a dozen of satellites, including SETI, SIRTf, CASSINI, GALILEO, ULYSSES, Voyager, Giotto, Pioneer, etc. His scientific interests are widespread which include space weather, solar science, plasma waves, ionospheric physics, auroral physics, etc. He received several honours including American Geophysical Union Medal, NASA Exceptional Service Medal, etc. In this lecture he talked about Solar Flares, Auroras, Magnetic Storms etc. Our Sun, although it looks bland by viewing it in visible light, is indeed responsible for solar flares and aurora borealis and australis at Earth. This science has recently been named "Space Weather". He also talked about how extreme space weather can have negative effects on mankind.

BOSE-125 Public Lecture by Prof. Wolfgang Ketterle: A BOSE 125 distinguished public lecture, entitled "Cooling close to absolute zero temperature: A recipe for discoveries", was delivered by Prof. Wolfgang Ketterle on March 27, 2018. Prof. Ketterle (born 21 October 1957) is a German physicist and professor of physics at the Massachusetts Institute of Technology (MIT). His research has focused on experiments that trap and cool atoms to temperatures close to absolute zero. In 1995, Prof. Ketterle led one of the first groups to realize Bose-Einstein condensation in these systems. For this achievement, as well as early fundamental studies of condensates, he was awarded the Nobel Prize in Physics in 2001, together with Eric Allin Cornell and Carl Wieman. After achieving the Bose-Einstein condensation in dilute gases in 1995, his group was in 1997 able to demonstrate interference between two colliding condensates, as well as the first realization of an "atom laser", the atomic analogue of an optical laser. Why do physicists freeze matter to extremely low temperatures? Why is it worthwhile to cool to temperatures which are a billion times lower than that of interstellar space? In this lecture, Prof. Ketterle talked about phenomena at low temperature and discussed new forms of matter. Of special interest are super fluids which can flow without dissipation. Recently, we have observed supersolid, which is fluid and solid at the same time. In addition to ongoing investigations of Bose Einstein condensates in ultra-cold atoms, Prof. Ketterle's more recent achievements have been the creation of a molecular Bose condensate in 2003, as well as an experiment in 2015, providing evidence for high-temperature super fluidity in a fermionic condensate.



13th C. K. Majumdar Memorial Lecture entitled "Bose, Boson & Bose Condensation" delivered by Prof. T. V. Ramakrishnan, Department of Physics, IISC Bangalore, Department of Physics, BHU, Varanasi on Feb 23, 2018 at the Silver Jubilee Hall, SNBNCBS

71st Foundation Day and S. N. Bose Memorial Lecture

Prof. Samit Kumar Ray, the Director of the S. N. Bose Centre, delivered the 71st Foundation Day Lecture of Bangiya Bijnan Parishad, Kolkata, on 25th January, 2018 in vernacular language. The Bangiya Bijnan Parishad was established by Prof. Satyendra Nath Bose.

Bose-125 Distinguished Lecture by T. Tsurutani

Bose-125 Distinguished Lecture on "Space Weather : Plasma Physics from the Sun to the Earth's Atmosphere" was delivered at S N Bose Centre on Feb 26, 2018 by Prof. Bruce T. Tsurutani, Jet Propulsion Laboratory California Institute of Technology, Pasadena, California, NASA, USA.

Bose-125 Distinguished Lecture by Prof. R. Ramesh

Bose-125 Distinguished Lecture on "Emergent Chirality & Phase Coexistence in Polar Vortices formed in Oxide Superlattices" was delivered at S N Bose Centre on March 6, 2018 by Prof. R. Ramesh, Department of Materials Science and Engineering & Department of Physics, University of California, Berkeley, Materials Sciences Division, Lawrence Berkeley Laboratory, Berkeley.

Bose-125 Distinguished Lecture by Prof. Bala Iyer

Bose-125 Distinguished Lecture on "The Rapid Leap from Gravitational Wave Detection to Multi-Messenger Astronomy" was delivered at the S. N. Bose Centre on March 9, 2018 by Prof. Bala Iyer, International Centre for Theoretical Sciences (ICTS), Bangalore.

Bose-125 Distinguished Lecture by Prof. Biman Bagchi

Bose-125 Distinguished Lecture on "Dynamics within Small Droplets: Dynamics of Water in Nano Spherical Confinement" was delivered at the S. N. Bose Centre on 17 July, 2018 by Prof. Biman Bagchi, Indian Institute of Sciences (IISc), Bangalore.

Bose-125 Distinguished Lecture by Prof. Supriyo Bandyopadhyay

Bose-125 Distinguished Lecture on "Straintronics: Extremely energy-efficient computing with strained nanomagnets" was delivered at the S. N. Bose Centre on July 27, 2018 by Prof. Supriyo Bandyopadhyay, Virginia Commonwealth University, USA.

Research Highlights

Exploring macroscopic limit of quantum world

Shiladitya Mal

Physical laws for describing micro-world phenomena are essentially different from the macro-world phenomena we perceive through our daily experiences. Microscopic particles are most successfully described by quantum mechanics, whereas, classical mechanics is sufficient for macro-phenomena related to large objects.

In classical physics, there is no distinction between large and small objects. The same physical laws are applicable to objects ranging from dust particles to objects like sun and Jupiter. After the advent of quantum theory, which differentiates between quantum and classical worlds, a perennial question remains as to how big an object should be so that quantum features cannot be observed.

To address the issue of probing the quantum-ness of macroscopic objects, Anthony J. Leggett and Anupam Garg proposed a test, deriving an inequality from two assumptions [1], namely, (A1) *Macrorealism per se* and (A2) *Non-invasive Measurability* (NIM). (A1) implies a macroscopic object, which has two or more macroscopically distinct states available, is at any given time in a definite one of those states. The NIM states that it is possible, in principle, to determine which of the states the system is in, without affecting the state itself or the system's subsequent evolution. We denote these two assumptions together as macro-realism (MR). An algebraic consequence of these assumptions, commonly known as the Leggett-Garg inequality (LGI), involves correlations between sequential measurements performed on the system at different times. Between two successive measurements, the system may evolve according to some specific dynamical rule.

Classical systems, obeying Newtonian mechanics compatible with the notion of MR, cannot be employed to obtain violation of LGI. Thus, the violation of LGI implies either one or both the assumptions pertaining to MR are

violated, revealing non-classicality of the underlying mechanism.

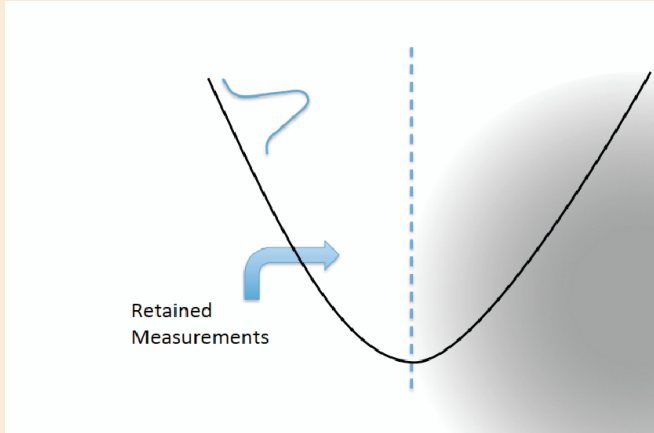


FIG. 1: The setup for testing the violation of macro-realism for an object in a coherent state in a harmonic well.

In our work [2], we propose a test involving a harmonic oscillator that can be implemented using a macroscopic particle, oscillating between two sides of a harmonic potential well. This particular test invokes a measurement scheme, which detects whether the particle is in the right or the left half of the oscillator. Detecting position of the particle is implemented through negative result measurement, which is crucial for the LGI test. This implies data are kept when detector is not clicked. For example, if the detector is placed on the right half of the oscillator and does not click, it means that the particle is on the left half of the oscillator. Therefore, position information of the particle is collected without direct interaction with the particle.

Our main result is that the non-classicality (in the sense described above) can be revealed for particles even with arbitrarily large masses. With today's state-of-the-art technology, it is possible to trap nano-objects with masses billion times heavier than that of the hydrogen atom. Suitably choosing relevant parameters (such as initial momentum), one could obtain the violation of LGI for larger masses, *i. e.*, for macroscopic objects. But, it may be difficult to set the relevant parameter for very large masses to observe such non-classicality. Moreover, it is to be noted that our proposal for testing the macro-limit of the quantum-world has lesser experimental complexity in comparison to competitive matter-wave interferometry experiments.

- [1] A. J. Leggett, and A. Garg, Phys. Rev. Lett. **54**, 857 (1985).
- [2] S. Bose, D. Home, and S. Mal, Phys. Rev. Lett. **120**, 210402 (2018).

Outreach Programmes



Symposium on Relativity and Quantum Mechanics

One Day Symposium on Relativity and Quantum Mechanics on March 21, 2018 was organized by the S. N. Bose National Centre for Basic Sciences, Kolkata in collaboration with Department of Physics, Karimganj College, Assam. A large numbers of students and teachers attended the Symposium.

C. K. Majumdar Memorial Summer Workshop

C. K. Majumdar Memorial Summer Workshop in Physics (CKMMSWP) 2018 was organized by S. N. Bose National Centre for Basic Sciences, Kolkata at its campus during May 23 to June 2, 2018.



Symposium on life and works of Acharyya Satyendra Nath Bose

On 17th March, 2018, Dr. Ramkrishna Das, Assistant Professor, Department of Astrophysics and Cosmology from the S. N. Bose Centre, delivered a popular level lecture on life and works of Acharyya Satyendra Nath Bose at the Siuri Vidyasagar College. The symposium was organized in association with Bangiya Bigyan Parisad as a part of organizing 100-lecture series in different schools and colleges across the state, to commemorate the 125th birth anniversary of Bose. About 135 students and 25 faculty members attended the seminar. Prof. Pijus kanti Ghosh, Physics Dept., Visva Bharati University also delivered lecture in the seminar. The event concluded with the Vote of Thanks by Dr. Nirmal Kr. Datta, Suri College, the coordinator of the event.



Recent Advancements in Astrophysics and Space Science

Prof. Sandip K. Chakrabarti, department of Astrophysics and Cosmology from the S. N. Bose Centre organized a conference on “Recent Advancements in Astrophysics and Space Science” at the Sidho Kanho Birsha University (SKBU), Purulia, West Bengal on 5th March, 2018. About

150 students and teachers participated the conference. The honorable Vice Chancellor and the Registrar were present at the inaugural session. All the talks were well attended. Considerable time was spent for question-and-answer sessions after each talk. All the students were also given a certificate signed by Prof. S. K. Chakrabarti (S. N. Bose Centre) and Prof. S. Mondal (SKBU).



A Seminar on “Scientific Detection of Honesty in Tea”

Prof. Samir K. Pal, S. N. Bose Centre, delivered a popular-level talk on “Scientific Detection of Honesty in Tea” at 56th INSPIRE Science Camp organised by the Jagadis Bose National Science Talent Search, Kolkata in association with the Department of Science and Technology, Govt. of India during March 26 - 30, 2018 at the J. B. Centre of Excellence for Student-scientists, Kolkata.

Recent Trends in Physical Sciences

On 16th March, 2018, an outreach program was organized by the S. N. Bose National Centre, in collaboration with Department of Physics, Tripura University, Tripura.



Recent Trends in Physical Sciences

On 19th March, 2018, a one-day conference on Recent Trends in Physical Sciences was arranged at the Vinoba Bhave University (VBU), Hazaribagh on 19th March, 2018. More than 200 students attended the conference. The proceeding started as Dr. Archan S. Majumdar, Senior Professor & Dean (Faculty) SNBNCBS, explained the scientific contribution and legacy of Bose to the participants. The Pro V. C., VBU, Dr. Kunul Kandir, and the Registrar, VBU, Dr. Bansidhar Prasad Rukhiyar were present in this session. It was then followed by a short film on the life and works of Bose and scientific talks by Dr. Rajib Mitra, Associate Professor, S. N. Bose Centre, Dr. D. Ganguly, VBU and Dr. N. Kumar, VBU. The conference was concluded by a short address by Prof. (Dr.) Ramesh Sharan, V. C., VBU.

Recent Trends in Physical Sciences

One-day symposium on Recent Trends in Physical Sciences on March 19, 2018 was organized by the S. N. Bose Centre, in collaboration with Department of Physics, Assam University, Silchar. About 165 students and 07 number of institutions attended the Symposium.



Bose Tagore National Advanced Workshop on “Recent Advances in Condensed Matter Physics: Theory and Experiment”

During 3-4 August, 2018, on the occasion of 125th birth anniversary of S. N. Bose, Bose Tagore National Advanced Workshop on “Recent advances in condensed matter physics: Theory and Experiment” was organized by Dept. of Physics, Visva Bharati, Santiniketan, in association with the S. N. Bose Centre.



Research trends in Multifunctional and Hybrid Nanomaterials

Multifunctionality of Hybrid Nanomaterials is a matter of intense discussion and enormous imagination, nowadays. A conference on “Research trends in Multifunctional and Hybrid Nanomaterials (CRMN 2018)” on 21st June, 2018 was organized by the S. N. Bose Centre, Kolkata, in collaboration Kazi Nazrul University, Asansol, West Bengal, to mark the celebration of 125th birth anniversary of Satyendra Nath Bose.

Bose-125 outreach activity at the Indian Institute of Technology Mandi

The IIT-Mandi conducted a one-day outreach activity on May 12, 2018 for the school and college students on the occasion of 125th birth anniversary of eminent physicist Satyendra Nath Bose. The activity was aimed at motivating the young students of the Mandi district in Himachal Pradesh and organized by Dr. Manoranjan Kumar and Dr. Thirupathaiah Setti. The activity was attended by 80 school children from the Government Senior Secondary School at Mandi and the 6 teachers of the school. There were approximate 40 participants from IIT Mandi, including student and faculties.





Science, Society and Acharyya Satyendra Nath Bose

Prof. Samit K. Ray, Director, S. N. Bose Centre, delivered a lecture on "Science, Society and Acharya Satyendra Nath Bose" on the occasion of "125th Birth Anniversary of Satyendra Nath Bose", organized by the National Library, Kolkata, in collaboration with Barisha Vigyan O Sanskriti Kendra, Kolkata on 24th July 2018. A Science quiz competition for the school students was organized on the occasion.

BOSE-125 Outreach Lectures

Seminar on "Science Towards Sustainable Development" by Prof. Samir K. Pal, S. N. Bose Centre at the Acharya Prafulla Chandra College, Kolkata on 6th August, 2018.

Commemoration of 157th Birthday Celebration of Acharya Prafulla Chandra Ray, Department of Chemistry, Lady Brabourne College in collaboration with Indian Chemical Society on 7 August, 2018. A lecture was delivered by Prof. Samir K. Pal, S. N. Bose Centre.

"Science Orientation Programme" at Ranaghat, Kolkata on 19 July, 2018. A lecture was delivered by Prof. Samir K. Pal, S. N. Bose Centre.

Seminar on "Nanotechnology for Quantum Devices" by Prof. Samit K. Ray, Director, S. N. Bose Centre at the Rahara Ramkrishna Mission, Kolkata, 7 April, 2018.

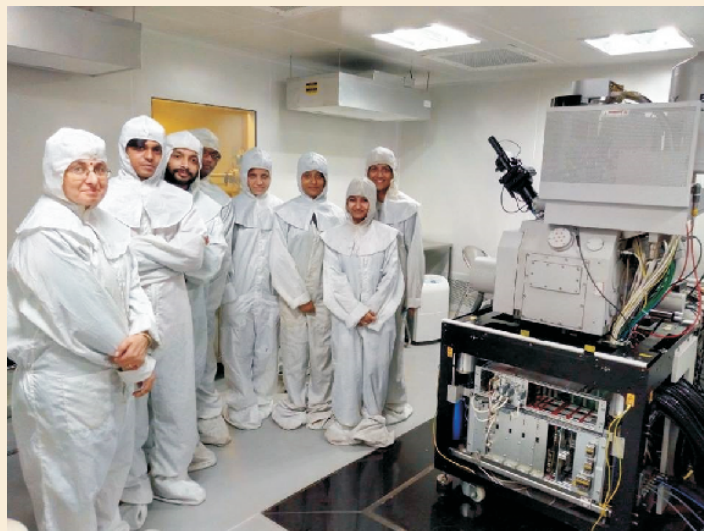
Seminar on "Ultrafast Spin Dynamics" by Prof. Anjan Barman, S. N. Bose Centre at the New Alipore College, Kolkata on 6 April, 2018.

Seminar on "Facets on Basic Sciences and Applications" by Prof. Samit K. Ray, Director, S. N. Bose Centre at the Bijoy Krishna Girls college, Howrah on 7th February, 2018.

Visits of students to the Bose Centre



Students from the University of Kalyani visited the S. N. Bose Centre on 3 August, 2018.



Final year M. Sc. (electronics) students from St. Xavier's College, Kolkata made an educational visit to the S. N. Bose Centre's Laboratories on 9 April, 2018.

Ph. D. Awarded / Submitted

Ph. D. degree awarded to students during January- July, 2018

Shiladitya Mal; Thesis Title: *Interlinking fundamental quantum concepts with information theoretic resources*; Thesis Supervisor: Archan S. Majumdar

Tanmoy Ghosh; Thesis Title: *Experimental and Theoretical Studies of Magnetic Alloys*; Thesis Supervisor: Pratip K. Mukhopadhyay.

Fernandes Karan Arthur; Thesis Title: *Field theories on curved space-times with boundaries*; Thesis Supervisor: Amitabha Lahiri.

Prasenjit Kar; Thesis Title: *Spectroscopic Studies On Nanomaterials For Solar Energy Harvesting Application*; Thesis Supervisor: Samir Kumar Pal.

Suman Som; Thesis Title: *Integrated Cavity Output Spectroscopy And Its Non-Invasive Applications In Biomedical Diagnosis*; Thesis Supervisor: Manik Pradhan.

Subhadipa Das; Thesis Title: *Study of Bipartite and Multipartite Quantum Nonlocality : Some Perspectives*; Thesis Supervisor: Archan S. Majumdar

Rishi Ram Ghimire; Thesis Title: *Investigation of opto-electronic phenomena in nanostructured ZnO with electric double layer gate*; Thesis Supervisor: Arup Kumar Raychaudhuri.

Sovik Roy; Thesis Title: *Study on entanglement and its utility in information processing*; Thesis Supervisor: Archan S. Majumdar.

Susobhan Choudhury; Thesis Title: *Study on Conformation and Ultrafast Dynamics In Biomolecular Recognition with Optical Laser Spectroscopy*; Thesis Supervisor: Samir Kumar Pal.

Debmalya Mukhopadhyay; Thesis Title: *Some Phenomenological Aspects of Topologically Massive Gauge Theories*; Thesis Supervisor: Amitabha Lahiri.

Chiranjit Ghosh; Thesis Title: *Cavity Enhanced Absorption Spectroscopy and its Application to Molecular Detection of Diabetes Mellitus*; Thesis Supervisor: Manik Pradhan.

Arpita Mitra; Thesis Title: *Nonrelativistic diffeomorphism invariance and its applications*; Thesis Supervisor: Rabin Banerjee.

Chandrima Banerjee; Thesis Title: *Experimental Study of Spin Waves in Magnetic Thin Films and Nanostructures*; Thesis Supervisor: Anjan Barman.

Paramita Saha; Thesis title: *Biophysical and Structural Characterization of Bacterial Protein STY3178*; Thesis supervisor: Mahua Ghosh.

Ph. D. thesis Submitted during January - July, 2018

Aslam Parvej; Thesis title: *Exotic Phases in Frustrated Low Dimensional Spin Systems*; Thesis Supervisor: Manoranjan Kumar.

Sumanto Chanda; Thesis title: *A Study of Geometry, Physics and Inerrability of Geodesics on Curved Spaces*; Thesis Supervisor: Partha Guha.

Hrishit Banerjee; Thesis Title: *Study of Electronic Structure of Organic and Inorganic Complexes*; Thesis Supervisor: Tanusri Saha Dasgupta (on lien to IACS) and Manoranjan Kumar.

Subrata Dev; Thesis Title: *Effect of extra-cellular nutrient environment and intra-cellular biochemical conditions on the chemotactic performance of E. coli*; Thesis Supervisor: Sakuntala Chatterjee.

Soumyadipta Pal; Thesis Title: *Electronic Structure Of Ni-Mn Based Heusler Alloys*; Thesis Supervisor: Chhayabrita Maji and Priya Mahadevan.

Ransell D'Souza; Thesis Title: *Electronic structure of Two-Dimensional Nanomaterials: Transport and Other Properties*; Thesis Supervisor: Sugata Mukherjee and Tanusri Saha-Dasgupta (on lien to IACS).

Subhadip Chakraborti; Thesis Title: *Studies of fluctuations in systems of self-propelled particles*; Thesis Supervisor: Punyabrata Pradhan

Soumyakanti Bose; Thesis Title: *Information Theoretic Aspects of Some Non-Gaussian Classical and Quantum Optical Fields*; Thesis Supervisor: M. Sanjay Kumar

News and Events (Administrative)

Documentary film on Bose

The documentary film on life and works of Acharyya Satyendra Nath Bose - 'An Iconic Genius', directed by Satyajit Ray Films and Television Institute (SRFTI), Kolkata and produced by the S. N. Bose Centre on the occasion of Bose-125 celebration, has been awarded the 'Best Science Film (Non Fiction)' award in the '16 Film International Festivals - 16IFF 2018', Jaipur.

International Yoga Day observed

The "International Yoga Day" was observed at the Centre on 21st June, 2018 through an interactive Yoga session by the staffs and students of the Centre.



Workshop on "Constitutional Provisions of the Official Language" organized by the S. N. Bose Centre's Hindi Cell

The Hindi Cell of the S. N. Bose Centre organized a workshop on "Constitutional Provisions of the Official Language" on 08.06.2018. Another workshop on "Drafting different forms of correspondence and writing" was organized on April 23, 2018, where some of the key speakers were Mrs. Manju Sirin, Assistant Director & Office President, Hindi Shikshan Yojana, Department of Official Language, Home Ministry, Government of India and Shri Vipati ji, Hindi professor, Hindi Shiksha Yojana, Official Language Department, Home Ministry.

New RF Furnace inaugurated at the Centre

The new infrastructure RF furnace has been inaugurated on 21st May, 2018 by the Director. It. This is the first such facility in India for basic research in alloys.



Swachhta Pakhwada observed at Centre

The Centre observed "Swachhta Pakhwada" during May 1 - 15, 2018, through a motivational lecture, entitled "The Best out of Waste", by Prof. S. K. Pal on 4th May, 2018. On this occasion, also a drama "Observance of swachhta at workplace" and an essay competition on "Waste Management" were held on 15th and 8th May, 2018, respectively.

Lecture on gender sensitivity

A lecture on "Gender Sensitivity and Prevention of Sexual Harassment of Women at Workplace" was delivered by Ms. Soma Sengupta, Managing Trustee, SANHITA (Gender Resource Centre), Kolkata on 16th February, 2018.

New Joining / Superannuation / Demise etc.

Academic

Superannuation: Subhrangshu Sekhar Manna (Dept. of Theoretical Sciences) on 31 January 2018

Joining:

Sunandan Gangopadhyay (Assistant Professor w.e.f. 12.12.2017)

Atindra Nath Pal (Assistant Professor w.e.f. 27.12.2017)

Thirupathaiah Setti (Assistant Professor w.e.f. 02.04.2018)

Suman Chakrabarty (Assistant Professor w.e.f. 24.05.2018)

Administration

Demise:

We express our sincere condolences on the untimely death of **Sukamal Das** (Staff) on 7th April 2018. Our hearts are saddened by the loss. Mr. Das rendered prolonged service with diligence in the Central Registry section of the S. N. Bose Centre.

Superannuation:

1. **Apurba K. Sarkar** Deputy Registrar (Finance) w.e.f. 1st April 2018.
2. **Sukanta Mukherjee** Assistant (General) w.e.f. 1st May 2018.3.
3. **Pradip Kumar Bose** Tradesman 'A' w.e.f. 1st August 2018.

PHOTOGRAPHY



A boat in the backwater of Vembanad lake, Kerala

A magnificent view of Kundala lake, Kerala, during the monsoon



Photographs by Indranil Chakraborty

Editorial Board:

Saumen Adhikari, Samyadeb Bhattacharya, Jaydeb Chakrabarti, Sanjoy Choudhury, Ramkrishna Das, Gurudas Ghosh, Manoranjan Kumar, Rajib Kumar Mitra, Punyabrata Pradhan, Subhashis Rana, Chaitrali Sengupta, Sumona Sinha

Coordinator:

Moumita Banik

For any comment, suggestion and input, please mail to: punyabrata.pradhan@bose.res.in

Published by:



Satyendra Nath Bose National Centre for Basic Sciences
Block-JD, Sector-III, Salt Lake,
Kolkata - 700 106