



**SATYENDRA NATH
BOSE NATIONAL
CENTRE FOR
BASIC SCIENCES**

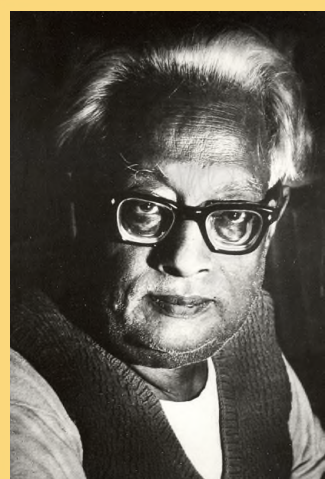


Newsletter

Volume 14, Issue 1 (2024)

Editorial:

We are very pleased to publish the first issue of Newsletter 2024. We appreciate the work of the Newsletter support staff and members. We thank all contributors for their timely and informative articles, which greatly enriched the newsletter. This issue covers academic and non-academic events in the second half of 2023, from June to December. We hope readers will enjoy it. We wish you a very Happy New Year 2024, with good health and success in your professional endeavours.



Professor Satyendra Nath Bose

News and Events (Academic)

Outreach Programme by the Centre

Visit to the Centre by schools students

Around 50 female school students from Jawahar Navodaya Vidyalaya, and Mahishadal Gayaswari Girls High School, located in a rural areas of Purba Medinipur, West Bengal, visited the S. N. Bose Centre on 22nd September, 2023. There were interaction with the Director, visit to different laboratories, visit to S. N. Bose Archive, orientation of telescope, sharing of research experience by women researchers, etc. The day-long outreach programme was part of Vigyan Jyoti: Empowering girls in STEM (Science Technology Engineering Mathematics).



Visit to the Centre by college students

A one-day outreach program under India International Science Festival, 2023 was organized at Sir Rajendra Nath Mukherjee Govt. Polytechnic, Basirhat, West Bengal on 21st December 2023 by S. N. Bose National Centre of Basic Sciences (SNBNCBS).



Discussion on Quantum Materials under the joint partnership of S. N. Bose Centre and IFW Dresden

A team of scientists from The Leibniz Institute for Solid State and Materials Research Dresden - IFW Dresden, Germany led by Prof. Dr. Bernd Büchner, Director IFW visited the Centre. There were 3 days of very engaging discussions in the area of Quantum Materials under the joint partnership of S. N. Bose Centre and IFW.



STATPHYS-Kolkata

STATPHYS-Kolkata (December 18-22, 2023) is an international conference series focusing on the broad area of statistical physics organized collaboratively by various educational institutions in Kolkata, India. The conference brings together researchers working in various branches of statistical physics from all over the world, providing a platform to exchange and share scientific ideas.



Colloquium / Named Lectures

6th G. N. Ramchandran Memorial Lecture

Prof. Chandrima Saha, J. C. Bose Chair Distinguished Professor at the Indian Institute of Chemical Biology, Kolkata, and the former Director and former Professor of Eminence at the National Institute of Immunology, delivered the 6th G. N. Ramchandran Memorial Lecture on the topic “Our cells to our rescue: the revolution in cell sciences” on 01.09.2023 at Silver Jubilee Hall, SNBNCBS.

Bose Colloquium

1. Prof. Tarun Souradeep Director, Raman Research Institute, Bangalore, delivered a lecture on the topic “Tests of the foundations of ‘standard’ cosmological model” on 21.07.2023.



2. Prof. Martin Aeschlimann, Professor in the Physics Department of the University of Kaiserslautern, delivered a lecture on the topic “Laser-Induced Intersite Spin Transfer” on 01.12.2023.



3. Prof. Prashant V. Kamat, Professor of Chemistry and Biochemistry and a principal scientist of the radiation laboratory, University of Notre Dame, delivered a lecture on the topic “Semiconductor Architectures: Nano-Scale Solutions for Macro-Scale Carbon Challenges” on 20.12.2023.



Institute Colloquium

1. Prof. Bharat Ratra, Professor of Physics, Kansas State University, delivered a lecture on the topic “The Accelerating Expanding Universe: Dark Matter, Dark Energy, And Einstein's Cosmological Constant” on 14.08.2023.



2. Prof. Christian Maes, Professor, Department of Physics and Astronomy, KU Leuven, delivered a lecture on the topic “Zig-zag dynamics in a Stern-Gerlach spin measurement” on 28.11.2023.



Other Seminars

1. Dr. Raj Kumar Sadhu, Post-Doctoral Researcher, Physical Approach of Biological Problems, Physical Chemistry Curie, Institut Curie, Paris, delivered a lecture on the topic “Cellular spreading and migration on curved surfaces” on 07.07.2023.
2. Dr. Sujoy Modak, Assistant Professor of Physics, Universidad de Colima, delivered a lecture on the topic “Revisiting the enigmatic early universe with T-vacuum state” on 13.07.2023.
3. Dr. Souvik Bera, Ph. D Scholar, Indian Institute of Science, Bengaluru, delivered a lecture on the topic “Epsilon Expansion of Multivariate Hypergeometric Functions In Terms of Multiple Polylogarithms” on 13.07.2023.
4. Dr. Ashutosh Rai, Research Assistant Professor, Korea Advanced Institute of Science and Technology, delivered a lecture on the topic “Non-Local and Quantum Advantages in Network Coding for Multiple Access Channels” on 25.07.2023.
5. Dr. Ananda G. Maity, PDRA, Networked Quantum Devices Unit, Okinawa Institute of Science and Technology, Japan, delivered a lecture on the topic “Noise can be resource in quantum communication” on 02.08.2023.
6. Dr. Nilanjan Mitra, Associate Research Professor, Hopkins Extreme Materials Institute (HEMI), Department of Mechanical Engineering, Johns Hopkins University, delivered a lecture on the topic “Materials @ Extremes” on 04.08.2023.
7. Prof. Jay Deep Sau, Professor, Department of Physics and Condensed Matter Theory Center, Co-director, Joint quantum Institute, University of Maryland, delivered a lecture on the topic “Search for Non-Abelian Majorana modes as a route to topological quantum computation” on 08.08.2023.
8. Dr. Anupam Kundu, Associate professor, International Centre for Theoretical Sciences, Bangalore, delivered a lecture on the topic “Integrability, chaos and thermalization in a collection of hard rods” on 08.08.2023.
9. Dr. Veer P.S. Awana, Chief Scientist: CSIR-NPL, India, FInstP (Fellow IOP-UK), delivered a lecture on the topic “Absence of superconductivity in LK-99 at ambient conditions” on 16.08.2023.
10. Dr. Ion Santra, Post Doc, Theoretical Physics, RRI, Bangalore, delivered a lecture on the topic “Activity driven energy transport” on 16.08.2023.
11. Dr. Dibyendu Das, Associate Professor, Department of Chemical Sciences, IISER Kolkata, delivered a lecture

- on the topic “Adaptive Life Inspired Objects via Systems Chemistry” on 22.08.2023.
12. Dr. Aveek Bid, Associate Professor, Department of Physics Department of Physics Indian Institute of Science, delivered a lecture on the topic “Tuning topological bands in graphene” on 31.08.2023.
 13. Dr. Dibya Chakraborty, Post-Doc, Ashoka University, delivered a lecture on the topic “The Conspiracy of dS Space in String Theory” on 04.09.2023.
 14. Prof. Joy Mitra, Professor, School of Physics, IISER - Thiruvananthapuram, Kerala, delivered a lecture on the topic “Engineering Strain Inhomogeneities in MoS₂ flakes” on 11.09.2023.
 15. Dr. Arnab Saha, Assistant Professor, Department of Physics, University Of Calcutta, delivered a lecture on the topic “Self-Organisation And Flow Of Information Within Confined Flock” on 25.09.2023.
 16. Prof. Parthanil Roy, Professor, Theoretical Statistics and Mathematics Division, ISI Bengaluru, delivered a lecture on the topic “How does memory affect random walks?” on 27.09.23.
 17. Dr. Bhaskar Mukherjee, Research Fellow. Dept of Physics & Astronomy, University College London, delivered a lecture on the topic “Is kinetic constraint sufficient to generate quantum many-body scars ?” on 03.10.2023.
 18. Dr. Amit Mukherjee, Assistant Professor, IIT Jodhpur, delivered a lecture on the topic “Application of Bell Nonlocality in vehicle routing problems” on 27.10.2023.
 19. Dr. Sudip Mukherjee, Assistant Professor, Post-Graduate Physics Department, Barasat Government College, delivered a lecture on the topic “Nonequilibrium steady states in coupled asymmetric and symmetric exclusion processes” on 01.11.2023.
 20. Dr. Sagnick Mukherjee, Ph. D student, Dept of Astronomy, The University of California Santa Cruz, delivered a lecture on the topic “Constraints on Atmospheric Mixing in Brown Dwarf and Exoplanet Atmospheres in the *JWST* Era” on 02.11.2023.
 21. Dr. Naqeeb Warsi, Assistant Professor, Indian Statistical Institute Kolkata, delivered a lecture on the topic “Quantum intersection with applications to communication in the presence of an adversary” on 03.11.2023.
 22. Prof. Anabha Basu, Professor, National Institute of Biomedical Genomics (NIBMG), delivered a lecture on the topic “Our Footprints on the Sands of Time” on 07.11.2023.
 23. Dr. Arpan Ghosh, Post-Doctoral Fellow, ARIES, Nainital, delivered a lecture on the topic “Monitoring of episodically accreting Young Stellar Objects” on 10.11.2023.
 24. Dr. Ruchika, Post-Doctoral Fellow, INFN (La Sapienza University of Rome), Rome, Italy, delivered a lecture on the topic “Investigating Cosmological Tensions in low and high redshift observational data” on 23.11.2023.
 25. Dr. Ayan Mitra, Post-Doctoral Fellow, IUCAA, India, delivered a lecture on the topic “Using Photometric Redshifts to Improve Dark Energy Constraints with Type Ia Supernova in the LSST Era” on 28.11.2023.
 26. Prof. Christian Maes, Professor, Department of Physics and Astronomy, KU Leuven, delivered a lecture on the topic “The Sun within: heat engines from active particle models” on 01.12.2023.
 27. Dr. Kishor Bharti, Research Scientist, IHPC@A*STAR, Singapore, delivered a lecture on the topic “Graph-based approach to Self-testing via contextuality and Bell nonlocality” on 01.12.2023.
 28. Dr. Arka Santra, Post-Doctoral Fellow, Weizmann Institute of Science, Israel, delivered a lecture on the topic “Probing New Physics at the LUXE Experiment” on 05.12.2023.
 29. Dr. Golam Haider, A Group Leader, Institute for Metallic Materials of IFW-Dresden, delivered a lecture on the topic “Scalable 2D heterostructures for quantum optoelectronics” on 06.12.2023.
 30. Prof. T.R. Govindarajan, Retired Professor, Theoretical Physics, Institute of Mathematical Sciences and Krea University, delivered a lecture on the topic “Fuzzy Dark Matter - Bose Connection!” on 08.12.2023.
 31. Prof. Prabal K Maiti, Professor, Department of Physics, Indian Institute of Science, delivered a lecture on the topic “2-TIPS and ordering in various active matter systems” on 13.12.2023.
 32. Dr. Susmita Roy, Postdoctoral Research Fellow, Condensed Matter Physics Division, Max-Planck Institute for the Structure and Dynamics of matter, Hamburg, Germany, delivered a lecture on the topic “Conventional and Time-resolved Raman scattering of strongly correlated materials” on 15.12.2023.
 33. Dr. Vikash Pandey, Assistant Professor of Applied Mathematics, Department of Computing and Data Sciences, FLAME University, Pune. , delivered a lecture on the topic “Dead matter has memory” on 15.12.2023.
 34. Dr. Partha Pratim Roy, Postdoctoral Research Associate, The Fleming group Lawrence Berkeley National Laboratory, University of California, delivered a lecture on the topic “Ultrafast Energy and Electron Transfer in Natural and Synthetic Light

Harvesting Investigated by Coherent Multidimensional Spectroscopy” on 21.12.2023.

35. Dr. Himadri Chakraborti, Postdoc at SPEC, CEA, CNRS, Université Paris-Saclay, France, delivered a lecture on the topic “Electron quantum optics in graphene” on 22.12.2023.
36. Dr. Suchismita Das, Post-Doc. Max Planck Institute for the Physics of Complex Systems, Dresden, delivered a lecture on the topic “Flocking by turning away” on 28.12.2023.

Scientific Stories

A Search for Superior Supercapacitors

Pradip Pachfule

Supercapacitors are a group of energy storage devices that lie between rechargeable batteries and dielectric capacitors. They have a higher power density than batteries and a higher energy density than ordinary capacitors. In other words, supercapacitors can store more electrical energy than capacitors and transfer the stored energy faster than batteries. Although supercapacitors cannot store as much energy as batteries, they have qualities that make them a great asset in many devices. They can be charged and discharged an infinite number of times, giving them a virtually infinite life, and they charge and discharge much faster than batteries. Wherever quick bursts of energy are needed, such as in torches, car starters or smart watches, supercapacitors are indispensable. Unlike batteries, supercapacitors are primarily pulse power devices with typical discharge times ranging from a few seconds to less than one second. They are also valued for their wide temperature range, environmental friendliness, improved safety, higher reliability and maintenance-free operation.

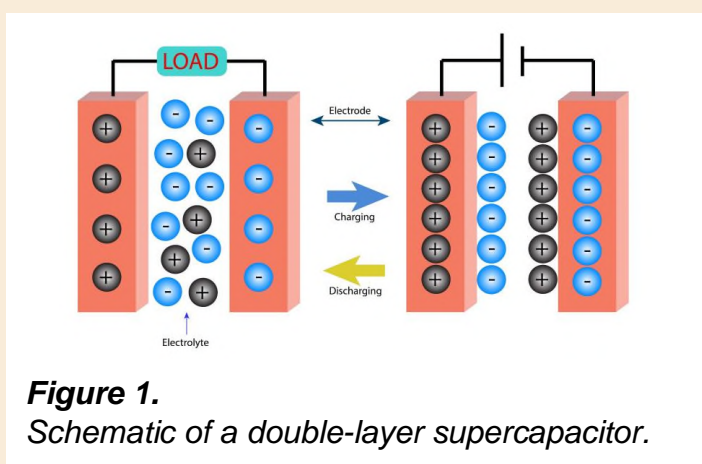


Figure 1.
Schematic of a double-layer supercapacitor.

Because of their unique properties, the search is on to make supercapacitors more reliable, more efficient and longer lasting. Based on their operating principle, supercapacitors are mainly divided into two types, such as pseudocapacitors and electric double-layer capacitors (**Figure 1**). Carbon-based materials such as graphene, which have excellent energy transfer properties, are commonly used as the electrode material for TLC. On the other hand, covalent organic frameworks (COFs) - a class of porous and crystalline organic materials - have proven to be efficient and versatile electrodes for pseudocapacitors because these materials have very low density, high stability, and well-defined atomic arrangements. Their chemical properties can be tailored by incorporating a wide range of organic functional groups into their backbone. The present study on COF was carried out by a team from the Department of Chemical and Biological Sciences at the S. N. Bose National Centre for Basic Sciences, led by Dr. Pradip Pachfule.

Dr Pachfule's team investigated the synthesis of a crystalline COF with dithiophenedione structures in its backbone (TTT-DHTD). The performance of this new COF as an electrode for supercapacitors was compared with that of a COF based on dimethoxybenzene-dithiophene (TTT-DMTD). When using a COF with organosulphur compounds, the charge is stored through an electrochemical redox process in which the charge-discharge occurs through a reduction-oxidation cycle.

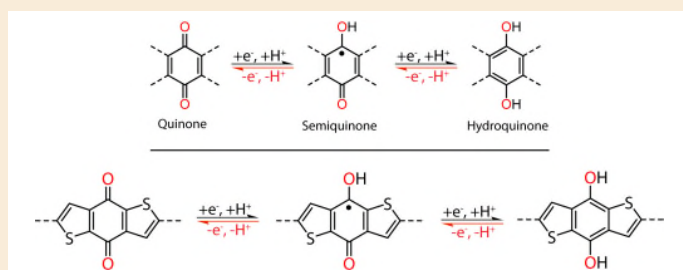


Figure 2.
Electrochemical redox reactions of quinones.

Redox-active quinones have shown promise as a low cost, environmentally friendly, high energy density option for energy storage (**Figure 2**). Dr Pachfule explains: "We present a dithiophenedione-based COF that incorporates redox-active quinone groups and sulphur-containing thiophene moieties in a highly crystalline and porous COF. Due to these combined properties, the dithiophenedione-based COF exhibits excellent pseudocapacitive energy storage performance.

The TTT-DHTD sample was prepared by a condensation reaction of 4,4',4''-(1,3,5-triazine-2,4,6-triyl)trianiline (TTT) with 4,8-dioxo-4,8-dihydrobenzo[1,2-b:4,5-b']dithiophene-2,6-dicarbaldehyde (DHTD) in a sealed Pyrex tube at 120 °C for 72 hours. The TTT-DMTD COF

used for the comparative study was also prepared by a similar procedure by reacting 4,4',4''-(1,3,5-triazine-2,4,6-triyl)trianiline (TTT) with 4,8-dimethoxybenzo[1,2-b:4,5-b']dithiophene-2,6-dicarbaldehyde (DMTD). The chemical stability of the COFs was evaluated in both water and alkaline solutions, as supercapacitor electrodes are typically operated in aqueous KOH liquid electrolytes. Both COFs fully retained their crystallinity in aqueous solution. The electrochemical performance of TTT-DHTD was evaluated by using it as the working electrode in a standard three-electrode system operated in a 1.0 M KOH electrolyte solution. In this setup, Pt was used as the counter electrode and Ag/AgCl as the reference electrode. To elucidate the role of the redox-active dithiophenedione moieties in the capacitive performance, the electrochemical performance of other COFs was also investigated. The cyclic voltametry (CV) curves show that the TTT-DHTD COFs have a capacitance as high as 273.3 F g^{-1} at 0.5 A g^{-1} – almost 15 times higher than their non-redox-active counterparts. Under aqueous conditions, the redox-active dithiophenedione moieties in TTT-DHTD undergo two-electron proton-coupled electron transfers, significantly increasing the capacitance (**Figure 3**).

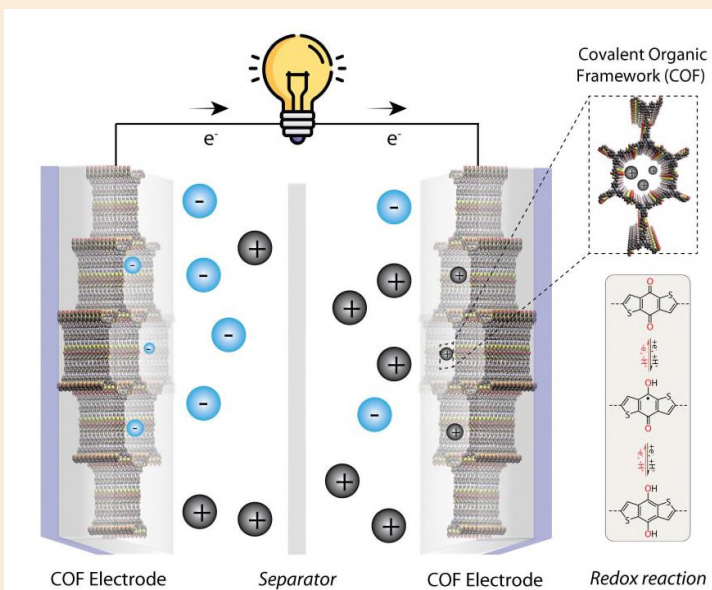


Figure 3.
Electrochemical redox reactions of quinones.

The charge storage performance of the TTT-DHTD was evaluated by analyzing galvanostatic charge-discharge performance at various current densities, where a stable, reversible, symmetric pattern was observed – suggesting a stable supercapacitor performance. Further, the cycling performance of the TTT-DHTD COF displayed a capacitance of 85 F/g after 2000 cycles, confirming the recyclability of COFs for supercapacitors. Also, the

supercapacitor performance of TTT-DHTD was found to be superior compared to its other COF materials.

The search for COF electrodes that give better results in terms of capacitance and stability will continue as supercapacitors find increasing applications in transportation as a stand-alone and complementary energy source, in renewable energy devices for pitch control of wind turbine blades, industrial machinery, electronics and home appliances. The findings of the S. N. Bose Centre team are a significant step forward in the production of high-quality supercapacitors.

This article is based on the paper “Dithiophenedione-Based Covalent Organic Frameworks for Supercapacitive Energy Storage” published in Applied Energy Materials on September 14th, 2023.

Link:

<https://pubs.acs.org/doi/10.1021/acsam.3c01072?ref=PDF>

Additional reference:

<https://www.sciencedirect.com/topics/chemistry/supercapacitors>

Ph.D. Awarded/Submitted

Ph.D. degree awarded

1. Bihalan Bhattacharya, Thesis title: Various Aspects Of Positive Maps In Quantum Information Theory. Supervisor: Archan S Majumdar.
2. Alik Panja, Thesis title: A Multiwavelength Study Of Galactic Star-forming Regions. Supervisor: Soumen Mondal.
3. Dhrimadri Khata, Thesis title: Understanding Physical Properties Of M-dwarfs: Optical And Near-IR Spectroscopic Studies. Supervisors: Soumen Mondal & Ramkrishna Das.
4. Samrat Ghosh, Thesis title: Understanding the Atmosphere of Brown Dwarfs and Low Mass Stars. Supervisor: Soumen Mondal.
5. Shounak Datta, Thesis title: Aspects of Quantum Correlations in Information Processing. Supervisor: Archan S Majumdar.
6. Riddhi Chatterjee, Relativistic quantum systems in the framework of quantum information and quantum foundations. Supervisor: Archan S Majumdar.
7. Arpan Bera, Thesis title: Spectroscopic Studies on Functional Nanohybrids and Their Potential Biological Applications. Supervisor: Samir Kumar Pal.
8. Md Nur Hasan, Thesis title: Optical Spectroscopy and Ab-Initio Study on Biocompatible Nanohybrids for Their Potential Biomedical and Environmental Applications. Supervisors: Samir Kumar Pal & Debjani Karmakar (BARC).

9. Joydeep Chatterjee, Thesis title: The electronic and structural properties of semiconductor heterostructures. Supervisor: Priya Mahadevan.
10. Koushik Mandal, Thesis title: Theoretical Investigations of Superconducting Pairing Mechanisms in Correlated Fermionic Systems. Supervisors: Ranjan Chaudhury & Manoranjan Kumar.
11. Vishal Kumar Aggarwal, Thesis title: Growth, Characterization, Optoelectronic And Thermal Properties Of Novel Germanium Nanostructures. Supervisors: Manik Pradhan & Arup K Raychaudhuri.
12. Edwin Tendong, Thesis title: Properties of materials at interfaces. Supervisors: Tanusri Saha Dasgupta & Jaydeb Chakrabarti.
13. Didhiti Bhattacharya, Thesis title: Opto-electronic, Electrical and Spectroscopic Studies of Some Two-Dimensional Materials. Supervisors: Samit Kumar Ray & Rajib Kumar Mitra.
14. Indrani Kar, Thesis title: Synthesis, Characterization, Transport and Electronic Structure Studies of Transition Metal Dichalcogenides. Supervisor: Thirupathaiah Setti.
15. Snehamoyee Hazra, Thesis title: Investigation On Nanostructured Piezoelectric Materials For Energy Harvesting. Supervisor: Barnali Ghosh (Saha).
16. Souma Mazumdar, Thesis title: Generalised Entropy In Dynamical System And Information Theory. Supervisor: Partha Guha.
17. Dhiraj Tapader, Thesis title: Studies of hydrodynamics and fluctuations in mass transport processes. Supervisor: Punyabrata Pradhan.
7. Swarnali Hait, Thesis title: Investigation of Magnetoelectric Properties in Transition Metal Oxides and Their Applications. Supervisor: Kalyan Mandal.
8. Sudipta Chatterjee, Thesis title: Investigation on transport and magneto-transport properties of 3d transition metal based compounds. Supervisors: Kalyan Mandal & Barnali Ghosh (Saha).
9. Shiladitya Karmakar, Computation Based Understanding and Prediction of Technologically Important Indigenous Materials. Supervisor: Tanusri Saha Dasgupta.
10. Anupam Gorai, Thesis title: Magnetic and Microwave Properties of Transitional Metal Oxide Based Nanostructures. Supervisor: Kalyan Mandal.
11. Susmita Changdar, Thesis title: Structural, Physical, and Electronic Properties Studies of Topological Materials. Supervisor: Thirupathaiah Setti.
12. Debayan Mondal, Thesis title: Investigating Electronic and Structural Properties of Hybrid Materials. Supervisor: Priya Mahadevan
13. Shobhan Dev Mandal, Thesis title: Bacterial chemotaxis in a noisy environment. Supervisor: Sakuntala Chatterjee.
14. Anirban Mukherjee, Thesis title: Studies of Hydrodynamics And Fluctuations In Sandpiles. Supervisor: Punyabrata Pradhan.
15. Atul Rathor, Thesis title: Duality In Lattice Gauge Theory. Supervisor: Manu Mathur.

Ph.D. thesis submitted

1. Anwesha Chakraborty, Thesis title: Some Physical And Mathematical Aspects Of Non-commutative Geometry. Supervisor: Biswajit Chakraborty.
2. Ankur Srivastav, Thesis title: Application of the Gauge/Gravity Duality in Physical Systems. Supervisor: Sunandan Gangopadhyay.
3. Anish Das, Thesis title: Investigation of geodesics and shadows of black hole spacetimes. Supervisor: Sunandan Gangopadhyay.
4. Neeraj Kumar, Thesis title: Thermodynamic Aspects of Black Holes. Supervisor: Sunandan Gangopadhyay.
5. Susmita Mondal, Thesis title: Studies on Biochemical and Molecular Aspects of Theranostic Redox Modulatory Nanomaterials in Preclinical Disease Model. Supervisor: Samir Kumar Pal.
6. Sumana Pyne, Thesis title: Spectroscopic Studies on Some Biologically Important Systems. Supervisor: Rajib Kumar Mitra.

News and Events (Administrative)

- 1) 76th Year of Independence Day celebrated at the Centre on 15th August, 2023 with pomp and gaiety. The Director, SNBNCBS hoisted the tricolor and inaugurated the "Opening of West Gate" of the Centre. Also, the Gym was inaugurated at Radhachura Hostel.



- 2) On the occasion of Hindi Fortnight celebration Hindi Pakhwada, a Hindi Essay Competition was organized at the Centre on 15th September, 2023 on the topic “Chandrayaan-3 : India’s Third Lunar Mission”. A “Hindi Extempore Speech Competition” was organized at Centre on 22nd September, 2023 and a Hindi Quiz Competition was organized at Centre on 29th September, 2023. The staff and students participated in these events.



Also a Hindi Workshop was held on 08.09.2023 titled “Karlayin Hindi and Tippan ebang Alekhan”. The Speaker was Shri Vinay Shukla, Anubhag Adhikari (Rajbhasha), Rajya Bima Nigam, West Bengal.

Another Hindi Workshop was held on 22.12.2023 titled “Kendriya Sarkar Ke Karyalayan mein Rajbhasha Karyavyan Se Sambadhit Rajbhasha Niti”. The Speaker was Shri Kamakhya Narayan Singh, Assistant Director (Rajbhasha), Department of Science & Technology, New Delhi.

- 3) As a part of Swachhata Pakhwada-Swachhata Hi Seva 2023 (Theme: Garbage free India), the staff and students participated in “Shramdan” on 1st October, 2023.



- 4) As a part of the observation of Vigilance Awareness Week 2023 during 30th October to 5th November, 2023, the staff and students of the Centre took pledge on 30th October, 2023. An essay writing competition on the topic “Say no to corruption; commit to the nation” was also organized on 30th October, 2023 and the staff and students participated.



- 5) The Centre celebrated the “Rashtriya Ekta Diwas (National Unity Day)” on 31st October, 2023 through a pledge taking ceremony.



- 6) The Centre organised the Workshop on “Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013” 08/12/23 at Silver Jubilee hall of the Centre. Speakers were, Prof. Suchetana Chatterjee, Presiding officer, ICC, SNBNCBS and Prof. M.P. Chengappa, NUJS, Kolkata. Many staff and students from the Centre attended the workshop.

Editorial Board:

Saumen Adhikari, Jaydeb Chakrabarti, Sanjoy Choudhury, Ramkrishna Das, Gurudas Ghosh, Manoranjan Kumar, Rajib Kumar Mitra, Punyabrata Pradhan.

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

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