Newsletter

S. N. Bose National Centre for Basic Sciences

Volume: 1 Issue: 2 Period: September – December, 2008 Published on: 26/02/2009

18th S.N.Bose Memorial Lecture

The 18th S.N.Bose Memorial Lecture was delivered by Professor Ashoke Sen, FRS; Harish Chandra Research Research Institute, Allahabad , India ; on "Black Holes and Strings", on December 29, 2009. Prof. Sen is internationally renowned scientist for his works in the string theory. The speaker started from the description of particles as 1-dimensional extended objects at Planck length, mainly closed srings and then he described various phases of closed strings, which are built up different vacuua of string theory. He showed how the string states could account for a microscopic description of black holes at finite temperature. The talk created a lot of enthusiasm among the audience which included even the high school students. *Dr. S. K. Paul*

Inside

Editorial Message:

We are happy to bring out the second issue of the online newsletter of our Centre. We sincerely thank all the contributors in the issue. However, we need more contributions to make the publication of the newsletter as a sustained activity (3 per year). Could we suggest all the faculty members to encourage their students to send a short note as soon as a paper is being published ? The ex-students of the centre who might have chance to look into the newsletter may enrich it by their contribution as well.

Editorial Board

Institute link: *http://www.bose.res.in/*

Helios NanoLab: 600 Dual Beam System

The dual beam Focus Ion Beam (FIB) system has been recently installed in our centre, which integrates ion and electron beams for FIB and Scanning Electron Microscope functionality in one machine. The electron column offers non-destructive imaging capability with ultrahigh resolution and magnification over 2500 kX. The ion column provides fast, precise milling and high-resolution imaging of the surface. The gas injection systems (GIS) are used for fast material removal with minimal re-deposition. The system is also provided with 'selective carbon mill GIS'. It has the optional micro manipulator which allows in-situ extraction of Transmission Electron Microscopy of sample. *Dr. Kaustuv Das*

Visit to National University of Singapore

A team of seven scientists from the S. N. Bose National Centre for Basic Sciences visited the National University of Singapore (NUS) during 6th to 8th August 2008 to explore the common research interests between the faculty members of physics department in the NUS and the S N Bose Centre. The team from S.N.Bose Centre consisted of Drs. A.K. Raychaudhri, A. Mookerjee, T. Saha-Dasgupta, P. K. Mukhopadhyay, K. Mandal, P. Mahadevan and S. Pal. The team from NUS consisted of Drs. F. Watt, J. Wei, P. Ho, C. K. Ong, Mahendiran, C. Haur, L. Baowen, W. Xuesen and L. Xiang-Yang. The meeting consisted of presentations from the members on topics, like electronic structure calculations, nonlinear optics, nanostructures, ferromagnetic shape memory alloys, organic electronics, oxides, magnetic materials and biological materials. On the final day of the meeting several different research laboratories were visited including the Synchrotron facility. The meeting ended with planning for future scope of collaborations. *Dr. Tanusri Saha-Dasgupta*





Epitaxial stabilization of ferromagnetism in an otherwise nonmagnetic oxide

Dr. Priya Mahadevan

Thin film growth allows us to stabilize crystal structures different from what is normally observed. This therefore allows the observation of unusual physical properties which one doesn't normally observe in a given material. Recently we have studied the magnetic properties of thin films of a transition metal oxide, $LaCoO_3$, which is nonmagnetic. While the bulk oxide occurs in the rhombohedral crystal structure, thin films allow the suppression of rhombohedral rotations and the stabilization of the tetragonal crystal structure whose unit cell dimensions depends strongly on the substrate strain. As a consequence, the system is found to favour a state which has a finite magnetic moment at each site, and is consequently ferromagnetic. The stability of the ferromagnetic state can be tuned by the substrate strain. This has tremendous technological applications as if the substrate is piezoelectric, then an electric field may be used to modulate the substrate strain and therefore control the magnetization of the oxide overlayers. *K. Gupta and P. Mahadevan, Phys. Rev. B (Rapid Comm.) (in press)*

Quantum cloning, Bell's inequality and teleportation

Dr. Satyabrata Adhikari

In quantum mechanics, quantum information is physical information that is held in the "state" of a quantum system. Therefore, the goal of the quantum information theory (QIT) is to answer the following questions: What happens if information is stored in a qubit? With the advent of quantum cryptography and quantum computing, understanding the limits of manipulation we can perform on quantum information, becomes important. The no-cloning theorem is one such limit i.e. if information is encoded in a qubit then it cannot be copied. This is due to the linear structure of quantum mechanics. But it does not rule out the possibility of approximate cloning of an arbitrary state of a quantum mechanical system. Buzek-Hillery (B-H) quantum cloning machine is one such approximate cloning machine which produces two approximate copies of the given arbitrary input qubit with optimum fidelity. The output of the B-H machine is an entangled two-qubit mixed state. It is known that all pure entangled state violates the Bell-CHSH inequality but for entangled mixed state Bell-CHSH operator may not be reliable entanglement witness. In our work, we have cited an example of two-qubit entangled state (output of the B-H machine) which does/does not violate the Bell-CHSH inequality for some interval of the machine parameter. Also we found that two-qubit mixed entangled state at the output of B-H cloning acts as an efficient quantum channel for the teleportation protocol (S. Adhikari, N. Ganguly, I. Chakrabarty and B. S. Choudhury, J. Phys. A: Math. and Theor., 41, 415302, 2008).

On the role of twisted statistics in the noncommutative degenerate electron gas

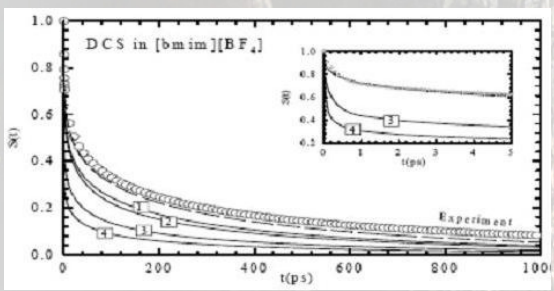
Dr. Biswajit Chakraborty

We consider the problem of a degenerate electron gas in the background of a uniformly distributed positive charge, ensuring overall neutrality of the system. In contrast to previous calculations that did not include twisted statistics, we find corrections to the ground state energy already at first order in perturbation theory when the twisted statistics is taken into account. These corrections arise since the interaction energy is sensitive to two particle correlations, which are modified for twisted anti-commutation relations (Subrata Khan, Biswajit Chakraborty and Frederik G. Scholtz, Phys.Rev. D 78 (2008) 025024.

Solvation in Room Temperature Ionic Liquids: Theory and Experiment

Hemant K. Kashyap

Recently, we have applied a molecular theory to predict the solvation dynamics in several room temperature dipolar ionic liquids (RTIL) where dipolar interaction between the solute probe and dipolar cation of the RTIL has been assumed to dominate the energy relaxation. This model calculation has reproduced semi-quantitatively the relaxation profile measured via time dependent fluorescence Stokes shift (TDFSS) experiments (curves 1, 2, 3 and 4). This calculation therefore indicates that in RTILs, where at least one of the constituent ions is possessing dipole moment, solvation energy relaxation is dominated by the dipolar interactions. In addition, solvation dynamics in such ionic liquids could be understood from the knowledge already gained through extensive study of fluorescence Stokes shift dynamics of an excited dipole in normal dipolar liquids. H. K. Kashyap and R. Biswas, *J. Phys. Chem. B*, 2008, *112*, 12431.



Distinguished Lectures, Seminars and Colloquia:

During this period a number of renowned Scientists have delivered lectures on various research areas. **Prof. Ajay Gupta**, The Director of Indore Centre (UGC-DAE Consortium for Scientific Research), has given lectures on " **Interface Studies in Multilayers**". **Prof. Sumit R. Das** from University of Kentucky discussed about the "**AdS-CFT correspondence**". **Prof. Deepak Kumar** from JNU, delivered lectures on "Electrical Transport in Disordered Solids". Renowned scientist from various institutes in India visited our Centre during this period. Among them notable visitors are: **Prof. John Corbett, Dr. U. Kaatze, Prof. A M Jayannavar, Prof. Kishore Marathe, Prof. Zindine Djadli, DR. Bijoy Singh, Dr. Siddhartha Sinha Dr. Santabrata Das and Dr. Ashim Kumar Roy**

The `**Bose Colloquium**' is still quite popular. Distinguished scientists and eminent scholars from other walks of life are invited to enlighten the audience with expositions from various interesting topics. During this period, **Prof Milan Sanyal** from Saha Institute of Nuclear Physics (SINP) talked about the "**Confinement ~ Induced Ordering in Condensed Mater**". **Prof. M. Vijayan** from IISc., Bangalore, gave an illuminating lecture on "**Half A Century Of Structural Biology In India: A Personal Perspective**". **Mr. Atanu Raha**, the Principal Chief Conservator of Forests West Bengal discussed with us how to use the Remote Sensing Technology for studying the Sunderban resources. **Mr. S. P. Gon Chaudhuri** of W B Green Energy Development Corp. Ltd. gave a lecture on "**Solar Energy – Global and Indian scenario**". **Prof. P. Mitra** from SINP talked about the interesting topic of "**Parity and time-reversal in the fundamental interactions**". **Prof. Partha P. Majumdar** of ISI, Kolkata, has given an illuminating lecture in which he discussed about the "**Peopling of South Asia: A Genomic View**".

Our student Sourav's seminar at SINP:

Sourav gave a seminar on his studies on the cosmic Nielsen-Olesen strings in space-times with a positive cosmological constant. For the free cosmic string in a cylindrically symmetric space-time, the Einstein equations are solved for metric subject to a coordinatization that the metric is locally flat on the axis. The repulsive effect of the positive cosmological constant was manifest for these geodesics. For a self non-gravitating cosmic string in a Schwarzschild de Sitter space-time, it has been shown to lead to Nielsen-Olesen equations unto a very good approximation if the string `core' is much smaller compared to the black hole and the cosmological event horizons.

The Nobel Prizes this year:

Physics: Yoichiro Nambu, Makoto Kobyashi and Toshihide Maskawa

Received the Nobel Prize this year for their discovery of the origin of the broken symmetry in subatomic particles which predicts the existence of at least three families of quarks in nature

Chemistry: Osamu Shimomuro, Martin Calfie, Roger Y. Tsein

The Nobel Prize in Chemistry goes to the discoverers of the remarkable brightly glowing green fluorescent protein, GFP, was first observed in the beautiful jellyfish, Aequorea victoria in 1962. Since then, this protein has become one of the most important tools used to develop a way to watch the processes that were previously invisible, such as the development of nerve cells in the brain or how cancer cells spread.

Physiology and Medicine: Harald zur Hausen, Françoise Barré-Sinoussi and Luc Montagnier

This year the Nobel committee has awarded the Prize for Physiology or Medicine to Harald zur Hausen for his discovery of human papilloma viruses (HPV) causing cervical cancer and to Françoise Barré-Sinoussi and Luc Montagnier for their discovery of human immunodeficiency virus (HIV). ***Prashant Singh, Post M.Sc.-Ph.D.***

In Brief

- Most unfortunately, the centre lost two of its staff members, **Sri. D. P Banerjee**, Office Superintendent & **Sri. Gopal Chandra Ghosh**, Driver.
- **Rs.** 25,913/- was donated to the Prime Minister National Relief Fund. The amount was accumulated by voluntary donation of 1 days salary of willing staff and faculty members.
- Students who submitted thesis:
  - S Shankara Narayanan
  - Debabrata Dutta
  - Sagar Chakraborty
  - Debapriya Banerjee
  - Manoranjan Ghosh
  - Soumendu Dutta
  - Sudipta Samanta
- The Vigilance Awareness Week 2008 (3-7 November 2008) was celebrated by the Centre with commencement of taking pledge on 3rd November 2008.
- Centre encouraged administrative employees to attend various training programmes and workshops:
  - National Residential Convention on "The Right to Information Act, 2005"
  - Residential Special Workshop on the Contract Labour (Regulation & Abolition) Act, 1970
  - Course on "Good Governance"

Off the beaten track

In a recent trip to coastal West Bengal I encountered some great bird habitats among scenic places. The places can be accessed by boat from Ramganga. A car can go up to Ramganga. We went past the islands of Patharpratima, Borho-rakhaskhali, Choto-rakhaskhali, Tater bazaar and Dhanchi. Dhanchi is deeply forested. These islands are just to the east of more popular tourist destination of Bok-khali. The area is a great habitat for waders like great thick knee, whimbrel, curlew and various plovers. The prime find of the trip was a brave collared kingfisher that posed for us up close. Of the nine species of kingfishers found in Sundarban this is a very sought after wild bird. In the company of many old hands at bird watching I found it to be the first sight of the bird among all of us. ***Prosenjit Singha Deo***

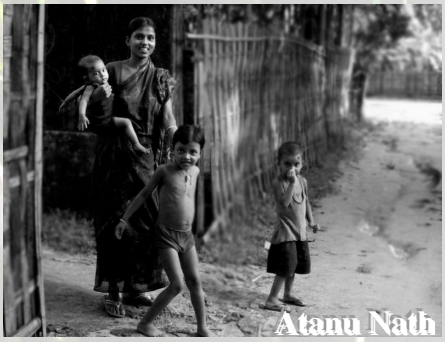
Winter Blues – a Seasonal Affective Disorder (SAD)

It's known to all that sunbeam takes a vital role in our life. But it holds a significant place in our minds too. Now-a-days, it is broadly being felt by the rapid change in nature of our lovely season winter. As if, the shadowy, cloudy and moist weather is diminishing the liveliness and spontaneity of our mind throughout the day. A recent analysis shows that any person, irrespective of age and gender, are being affected of this seasonal disorder called "Winter Blues" owing to absence of the known nature of sunny weather in winter. Unwillingness of eating, lack of energy in work, drowsiness, lowness of spirit, tiredness etc. are some symptoms of it. Psychologists say that acuteness of winter blues may lead to suicidal efforts also. People, who are suffering from this depression, should engage themselves wearing colourful clothes, enjoying favourite dishes, traveling, spending time with family & friends and of course doing some daily exercises. So, enjoy the season as it comes! …. Live Healthy. ***Mitali Nanyasi, Administration***

केन्द्र में राजभाषा का प्रगामी प्रयोग

सुश्री बनर्जी (दत्ता), प्रशासन

कार्यालय में सितम्बर के महीने को राजभाषा महीना के रूप में मनाया गया ।इस महीने में दो कार्यशालाएँ आयोजित की गईं जिनमें से प्रथम में हिन्दी शिक्षण योजना के उपनिदेशक (पूर्व)श्री एस एल एस पूर्ती तथा श्री प्रवीण कुमार , मुख्य प्रबंधक राजभाषा, इलाहाबाद बैंक ,व्याख्यान प्रदत्त आमंत्रित किए गए तथा दूसरे में डॉ.चिरश्री बॅनर्जी ने **भूमि उपयोग पद्धति** पर व्याख्यान प्रदान किया । हिन्दी में खुले प्रश्नमंच का आयोजन भी किया गया जिसमें केन्द्र के संकाय, छात्र, अधिकारियों तथा कर्मचारियों ने भाग लिया ।एक दिन हिन्दी चलचित्र प्रदर्शन की व्यवस्था की गई तथा समापन समारोह में प्रधान अतिथि के रूप में विशिष्ट नाट्य व्यक्तित्व श्रीमति उषा गांगुलि उपस्थित थीं एवं उनके नाट्य-दल 'रंगकर्मी ' ने महाश्वेता देवी की कहानी पर अवलंबित हिन्दी नाटक **श्री गणेश महिमा** पेश की । केन्द्र के पाँच अधिकारियों ने राजभाषा संस्थान द्वारा 4-6 नवम्बर को डलहौजी में आयोजित हिन्दी कार्यशाला तथा संगोष्ठी में भाग लिया एवं अंशकालिक हिन्दी अधिकारी ने वहाँ आलेख प्रस्तुति में प्रथम पुरस्कार प्राप्त किया ।


Atanu Nath


From S. N. Bose Gallary


Veja Dupur / Atanu Nath