Foreword

The S.N. Bose National Centre continued to build upon its solid foundation of academic excellence throughout the year. One of the youngest academic institutions in a city often burdened with history, it is slowly being recognized as a Centre where the highest quality teaching and research go hand in hand. The quality of research of its largely young faculty is amply reflected in the publication list in first rate national and international journals. The theoretical component of research at the Centre had already been strong. However, it was recognized that science cannot be complete without experimentation. The last year saw a huge spurt of growth in the area of experiments both in Physical and Chemical Sciences. The Unit for Nanoscience and Technology, funded by the Department of Science and Technology, Government of India, was set up in the Centre under the able guidance of Prof. A.K. Raychaudhuri, who joined the Centre from the Institute of Science, Bangalore. Young experimental scientists who joined the Centre during the year have already set up laboratories working in problems in the frontier areas. Our young colleague Dr. Tanusri Saha-Dasgupta was awarded the Swarna Jayanti award for her work on novel materials.

The 5th C.K. Majumdar Lecture was delivered by Prof. Jainendra K. Jain, Erwin W. Mueller Professor, The Penn State University, USA on *A new class of fermions in physics* on 2 August 2005. His novel idea of composite fermions and their relation to the quantum Hall effect drew a large and fascinated audience.

The Kolkata Kolon lectures, initiated by my predecessor, Prof. Sushanta Dattagupta continued throughout the year. The April Kolon was delivered by Prof. V. Balakrishnan, IMSc, Chennai . He spoke on *From Brownian Motion to Fractal Flights*. The May Kolon saw Dr. Debashish Bhattacharjee, Chief R & D and Scientific Services, Tata Steel talking to us on *Steel – a long past , a burgeoning present and a bright future*. In June and July, the Kolon switched gears to biology oriented topics. Dr. V. P. Sharma, M.N. Saha Disguished Fellow, National Academy of Sciences, New Delhi, spoke on *Fighting malaria in India*, while Prof. Ashok R. Thakur, VC, West Bengal University of Technology spoke on *Resource mapping in east Kolkata wetlands*. In August, we invited Shri Biplab Kumar Bagchi, Inspector of Police, Intelligence Branch, West Bengal to tell us about *A conscious citizen and Human Rights*. His informative story of the Purulia arms drop case provided fascinating insights into a murky episode. In September, we returned to the basic sciences again with Prof. S.K. Joshi, Distinguished Emeritus Scientist, CSIR & Honorary Vikram Sarabhai Professor. He spoke on *Some facets of physics in the twentieth century*. In October we had Prof. J. Palchaudhuri, Director, Bose Academy and, prior to his retirement, the Administrative Officer of this Centre, speaking to us about *Whither Africa*. Dr. Palchaudhuri had spent a large part of his active academic life in West Africa and Ethiopia. In November, during the Vigilance week, Mr. P. C. Pati, Dy. Director(Vigilance) East Zone expounded on *Vigilance Awareness*.

The Indo-US S&T Conference on Novel and Complex Materials was held at the Hyatt Hotel and S.N. Bose National Centre for Basic Sciences, Kolkata during October 26-29, 2005. The goals of the conference were to develop collaborations

between U.S. and Indian scientists working in the development of novel materials, in particular, between solid state chemists and theoretical physicists. In keeping with the conference goals, there were informal discussion opportunities, including a boat dinner and panel discussion, in addition to oral and poster presentations of recent results. The conference was attended by 70 scientists, including 25 student participants and 10 postdoctoral fellows. The discussion led to a broad consensus that there are many potential synergies between Indian and U.S. activities in the novel materials field. Ways forward and strategies for enhancing cooperation were also discussed during the conference.

The central organised the Conference *Non-Commutative Geometry and Quantum Physics* to discuss recent developments in Noncommutative Geometry and Quantum Physics with applications to gravity, particle physics and condensed matter systems during. Doctoral, post-doctoral, research and teaching staff at institutes, universities, colleges participated in the conference.

We organized a *Meeting on Condensed Matter Days* on 10-11 March 2006. The meeting covered various branches of Condensed Matter Physics. It was divided into six sessions, of which, two were on Disordered Systems(chaired by Mesbahuddin Ahmed), two were on Statistical Mechanics (chaired by Surajit Sengupta), one was on Clusters(chaired by B. M. Deb) and one session was devoted for the falicitation of Prof. Abhijit Mookerjee, Sr. Professor of the Centre who completed sixty years.

As in the previous years, this year too, we held an *In-House Meeting* titled SNBOSE FEST'06 during 23-24 March 2006. All the students, research scholars, post docs and faculty participated and presented their work. There were 4 sessions in all, namely Condensed Matter Physics-I (Chaired by Prof. A. K. Majumdar); Complex Systems in Physics, Chemistry and Biology (Chaired by: Prof. J. K. Bhattacharjee), High Energy Physics, Astrophysics,Cosmoogy and Mathematics(Chaired by: Prof. Asim Ray) and Condensed Matter Physics-2 (Chaired by Prof. K. Srinivasan). There were poster sessions. The meeting concluded with poster presentations.

The inauguration of our post-B.Sc. Integrated Ph.D. Programme in the Chemical Sciences took place this year. This unique inter-institutional collaboration saw the Centre joining hands with the Indian Association for the Cultivation of Sciences in floating this programme. The course structure is novel and quite unlike standard courses in Chemistry in that it has a large component of quantum chemistry and materials studies. Innovative experimentation is also a hallmark of this course.

The post-B.Sc. Integrated Ph.D. Programme began its fourth year since inception. This year too, the Paul Foundation of Kolkata, awarded its annual cash award of Rs 50,000 jointly to Ms. Tapati Sarkar and Ms. Soma Das. The first batch of the post-B.Sc. Integrated Ph.D. Students completed their Masters programme and were awarded M.Sc. degrees by the West Bengal University of Technology. They have now embarked on the research programmes.

To conclude, I must record my appreciation to the Annual Report Committee comprising of Dr. S. K. Sharma (Chairman), Dr. Priya Mahadevan, Dr. Samir K. Pal and Ms. Shohini Majumder for their help in editing and finalizing this Annual Report.

Abhijit Mookerjee
Acting Director

Group Activities

1. Electronic Structure & Physics of Materials

The group has five faculty members working on theoretical aspects(A. Mookerjee, S. Mukherjee, R. Choudhuri, T. Saha-Dasgupta and P. Mahadevan) and one faculty member working on experimental aspects (K. Mandal).

The group has thirteen research fellows and three post-docs.

The group is active in the areas of disordered systems, strongly correlated systems, clusters, high-T_c superconductors, dilute magnetic semiconductors, ultrafast processes in materials, CMR compounds, magnetic nanoparticles etc. Several collaborative projects, national and international, are running currently by several members of this group. Several conferences were organized by the group members, notably *Indo-US Conference on Novel and Complex Materials* and *Indo-EU Meeting on Computational Material Science* (co-organized by T. Saha-Dasgupta). T. Saha-Dasgupta was awarded Swarnajayanti Fellowship of the DST in 2005.

Sugata Mukherjee
Group Head

2. High Energy Physics & Mathematical Physics

The group was engaged in the research and teaching (PBIR and PMSc) activities of the Centre. Research was done at the frontline areas of the subject. Topics like noncommutativity in quantum mechanics, fields, strings and gravity, deformed symmetries, monopole confinement, aspects of superfield formulation in BRST symmetries and nonabelian gauge theories, black holes in cosmology and cosmological models etc. were covered.

The Indo-South Africa DST project with Dr. B. Chakraborty and Prof. F. Scholtz as the respective Principal Investigators continued fruitfully. Prof. S. Deguchi from Tokyo continued his collaborative work with Dr. R. Banerjee and visited the group for about a month. Also, there were some TPSC visitors. The group organised at the Centre an International Conference on *Noncommutative geometry and quantum physics* (with Dr. R.Banerjee and Dr. B.Chakraborty as Conveners) from 4-10 January 2006. Several leading physicists in this area participated. There were about 50 participants of which roughly 20 were from abroad.

Rabin Banerjee
Group Head

3. Optics, Mesoscopic Phenomena & Chemical Physics

This group has seven faculty members and about fourteen students enganged in research work in the following topics of Optics, Quantum Optics and Laser Physics, Mesocopic Physics and Chemical Physics:

1. Size determination of micron sized particles in an ensemble of randomly distributed scatterers. S. K. Sharma plans to apply this method to biological and interplanetary dust systems.

2. Nonclassical states such as squeezing out noise in photonic and atomic (spin) systems.

3. Study of quantum entanglement and its properties such as monogamous behaviour

mediated by cavity-QED and its experimental artifact, the so-called micromaser.

4. Properties of qutrit entanglement.

5. Laser cooling of molecular vibrations.

6. Electron transfer through a network of dendrimeric molecules.

7. Density of states in a quantum wire. Charge fluctuations in a ring when it is coupled to a wire or another ring.

8. Ultrafast dynamics and protein functions.

9. Charge transfer reactions in electrolyte solutions.

10. Chemical dynamics in supercritical fluids and binary mixtures.

11. Diffusion limited quenching in complex environment.

12. Theoretical studies of conductivity and dielectric relaxation.

Based on the above work, the Group has published fourteen papers and some papers are in the final stages of preparation. S. K. Pal and R. Biswas have been granted research projects by the DST and CSIR. One offshoot of the research activities of the Group is quantum information in which N. Nayak is involved in collaboration with Archan Majumdar. Recently, Sanjay Kumar has included this in his research topics. The group members have been regularly attending national as well as international conferences.

In addition, the Group members took part in the teaching activities of the Centre and shouldered administartive responsibilities.

Students participated in the meetings regularly. Faculty members and students of the Centre often attended these meetings. Professor M.A. B. Whitaker of the Queen's University, Belfast, UK and Professor Naresh Chandra of the IIT, Kharagpur visited the Centre for intensive interactions with the QIWG. There is a plan to extend this activity to the next year.

Nilkantha Nayak
Group Head

4. Astrophysics

Astrophysics group has been working on the accretion processes on black hole and emitted radiation spectrum. It has also obtained all possible flow solutions when large scale magnetic field is present. Multi-wavelength campaign has been made to observe SS433 and the results have been published. Two students of the group (S. Das and A. Nandi) received their Ph.D. degrees from Jadavpur University working on these topics. The group has been involved in collaborative work with Centre for Space Physics while participating in RT-2 satellite work aboard CORONAS-PHOTON satellite. Our group members participated in District/State Level quiz competitions and districtwise space science symposia held in Dakshin Dinajpur and Darjeeling districts all of which were organized by Centre for Space Physics.

Sandip K. Chakrabarti
Group Head

Seminars and Colloquia

The following speakers delivered talks at the various seminars organised at the Centre during 2005-06 :

- **Balakrishnan,Radha,** Institute of Mathematical Sciences, Chennai, *Geometry and Nonlinearity: Some Applications in Physics*, 5 April 2005.

- **Bhattacharjee, J. K.,** Indian Association for the Cultivation of Science, Kolkata, *Universality in the Kitchen Sink*, 19 April 2005.

- **Bandopadhyay,Sanjoy,** IIT, Kharagpur, *Large Scale Computer Simulation Studies of Complex Molecules in Solutions and Interfaces*, 26 April 2005.

- **Shapiro, Moshe,** The Weizmann Institute, Israel, *Principles of Coherent Control and the Automatic Detection and Correction of Mutations by Coherent Light*, 28 April 2005.

- **Bajpai, R. P.,** NEHU, Shillong, *From Photons to Biophotons : A Journey towards the Physical Basic of Life,*10 May 2005.

- **Das, Amal K.,** IIT, Kharagpur, *Growth and Characterization of (magnetic) Thin Films by Cantilever Beam Technique,* 13 May 2005.

- **Vijay, Amrendra,** Department of Chemistry, University of Houston, Houston, Texas, USA, *Scattering, Bound States and Thermal Rates: a Spectral Filter Approach*, 17 May 2005.

- **Trivedi, Lokesh C.,** Tata Institute of Fundamental Research, Mumbai, *Heavy Ionatomic Collisions with Atom, Molecules& Clusters: Collective Effect & Interference*, 27 May 2006.

- **Chatterji, Apratim**, Institut fur Physik, Johannes Gutenberg-Universitat Mainz, Germany, *Heavy Ionatomic Collisions with Atom, Molecules& Clusters: Collective Effect & Interference*, 17 June 2005.

- **Majumdar, Parthasarathi**, SINP, Kolkata, *Thermal Stability of Black Holes*, 29 June 2005.

- **Chaudhuri, Abhishek**, SNBNCBS, Kolkata, *Stress Relaxation in a Perfect Nanocrystal by Coherent Ejection of Lattice Planes,* 15 July 2005.

- **Felix, Kahle**, Max Planck-Gesellschaft, Germany, *Max Planck Society-Basic Research at the Frontiers of Science,* 21 July 2005.

- **Gopakumar, Rajesh,** HRI, Allahabad, *From World Sheet to Spacetime,* 22 July 2005.

- **Bhattacharya, Bimalendu B.**, SNBNCBS, Kolkata, *Tsunami: A Secondary Effect of Earthquake in the Dynamic Earth*, 16 August 2005.

- **Dadhich, Naresh**, IUCAA, Pune, *Gauss-Bonet Gravity*, 17 August 2005.

- **Das, Saurya**, University of Lethbridge, Alberta,Canada, *Is Entanglement Entropy Proportional to Horizon Area*, 23 August 2005.

- **Chatterji, Surojit,** Taiwan, *One Dimensional Nanostructures: Preparation and Applications*, 24 August 2005.

- **Tanimura, Y.,** Kyoto University,Japan, *Stochastic Liouville, Langevin, Fokker-Planck and Master Equation Approaches to Quantum Dissipative Systems*, 22 November 2005.

- **Gupta, Ranjan,** IUCAA, Pune, *Interstellar and other dust models*, 24 November 2005.

- **Chattaraj, P. K.,** Indian Institute of Technology, Kharagpur, *Chemical Reactivity Dynamics within a Quantum Fluid Density Functional Frame-work,*5 December 2005.

- **Das, M. P.,** Austraslian National University, Cannbera, Australia, *High T_c Superconductivity*, 14 December 2005.

- **Ray, Arnab K.,** Harish Chandra Research Institute, Allahabad, *A Time-Dependent Perturbative Study of the Shallow Water Hydraulic Jump*,23 December 2005.

- **Chandra, Amalendu,** IIT Kanpur, *Hydrogen bond dynamics in aqueous solutions under normal and supercritical conditions,* 12 January 2006.

- **Datta, Animesh,** University of New Mexico, Albuquerque,New Mexico, USA, *Entanglement and Power of one Qubit,* 17 January 2006.

- **Gupta, Y.,** *Exploring the Radio Frequency Universe with GMRT,* 20 January 2006.

- **Pati, Swapan K.,** JNCASR, Bangalore, *Negative Differential Resistance in Molecules: A Microscopic Theory*, 24 January 2006.

- **Bhattacharjee,Somendra M.,** Saha Institute of Nuclear Physics, Kolkata, *Unzipping DNA : Two Ensembles in Biology,* 31 January 2006.

- **Mozumdar, Subho,** Department of Chemistry, University of Delhi, Delhi, *Microemulsions : A Soft Chimical Route of Synthesizing Stable Nanoparticles With Some Application,* 6 February 2006.

- **Whitaker, A.,** Physics Department, Queens University, Belfast, *Einstein and Quantum Theory : the Myths and the Message,* 27 February 2006.

- **Das, Bidisa,** Nanotechnology Research Institute, AIST, Tsukuba, Japan, *Theoretical Studies of Molecular Devices*, 16 March 2006.

- **Chakrabarti, Abhijit,** Saha Institute of Nuclear Physics, Kolkata, *Differential Cross-talk of Hemoglobin Variants with Spectrin : Implications in Hemoglobin disease,* 21 March 2006.

- **Pal, Bonamali,** *Preparation and Characterisation of Core-shell Nanoparticles haveing void space by Size-selective Photoetching Techniuqe and their application in Photocatalytic Reaction, 28* March 2006.

R.P. Malik
Seminar In-Charge (till 22 November 2005)

&

Ranjit Biswas
Seminar In-Charge (from 23 November 2005)

The Theoretical Physics Seminar Circuit (TPSC)

Persons visiting the Kolkata centre under TPSC programme in 2005-06 were as follows:

- **Maharana, J.,** Institute of Physics, Bhubaneswar**,** *Aspects of String Cosmology*, 18 April 2005.

- **Sengupta, Krishnendu,** Harish Chandra Institute, Allahabad, *Superfluid-Insulator Transition of Two-Species Bosons in an Optical Lattice,* 25 July 2005.

- **Balachandran, A. P.,** Syracruse University, USA, *Quantum Physics with Space-Time Noncommutativity*, 4 August 2005.

- **Mazumdar, Kajari,** Tata Institute of Fundamental Research, Mumbai, *Search for a needle in the hay-stack !*, 11 August 2005.

- **Simon, R.,** Institute of Mathematical Sciences, Chennai, USA, *Some Open Problems in Quantum Information Theory*, 25 August 2005.

- **Das, Sourin**, Weizmann Institute, Israel, *Novel renormalisation group fixed points in junction of "quantum hall edge states" and "quantum wires"*, 19 October 2005.

- **Chaturvedi, S.**, University of Hyderabad,Hyderabad, *Wigner Distributions on Groups,* 28 November 2005.

- **Sarker, Sanjoy K.,** University of Alabama, /USA, *Spin Gas Phase and Superconductivity in t-J Model*, 8 December 2005.

- **Hari Dass, N. D.**, Institute of Mathematical Sciences, Chennai, *String Formation in Gauge Theories,* 21 February 2005.

- **Pastor, Gustavo M.,** University of Toulouse, France, *Magnetic Anisotropy & Spin Reorientation Transitions in Nanoparticles and Nanostructured Materials,* 23 February 2006.

- **Deguchi, Shinichi**, Nihon University, Japan, *Derivation of Non-abelian anomalies based on an extended BRST symmetry,* 17 March 2005.

- **Dua, Piyush**, Amity University, Noida, *A variational study of periodic Anderson model with superconducting correlations,* 27 March 2005.

Sugato Mukherjee & Biswajit Chakrabarti
Conveners, TPSC

Dr. Biswajit Chakrabarti joined as TPSC Co-convener in place of Dr. Manu Mathur since February 2006.

Visitors at the Centre

Apart from the Seminar, TPSC and Guest Speakers who visited the Centre from time to time ,the following scientists visited the Centre during 2005-06

- **Sen, Surajit,** Department of Physics, Guru Charan College, Silchar, Assam, collaborative research work with Dr. Gautam Gangopadhyay, 18 May-18 June 2005.

- **Mandal, Bhabani Prasad,** BHU, Varanasi, collaborative research work with High Energy Physics group , 1 June-9 July 2005.

- **Sarma, D. D.**, IISc., Bangalore, 17-19 July 2005 visited as Senior Associate of SNBNCBS.

- **Jayannavar, A. M.**, Institute of Physics, Bhubaneswar, 21-27 August 2005.

- **Mishra, Arun Kumar** , L. N. Mithila University, Darbhanga, visited the Centre as Associate Visiting Scientist from:

  (i) 5-12 August 2005

  (ii) 17 October -11 November 2005;

  (iii) 9-18 March 2005

The Committees

Governing Body

The composition of the Governing Body of the Centre during the year 2005-2006 was as follows :

1. **Professor V. S. Ramamurthy** — *Chairman*
   Secretary
   Department of Science & Technology
   Government of India
   New Delhi

2. **Dr. P. K. Kaw** — *Member*
   Director
   Institute of Plasma Research
   Gandhinagar

3. **Professor N. Kumar** — *Member*
   Director
   Raman Research Institute
   Bangalore

4. **Professor G. K. Mehta** — *Member*
   DAE Senior Scientist
   Nuclear Science Centre
   New Delhi

5. **Joint Secretary & Financial Adviser** — *Member*
   Department of Science & Technology
   Government of India
   New Delhi

6. **Chief Secretary** — *Member*
   Government of West Bengal
   Kolkata

7. **Prof. Abhijit Mookerjee** — *Member*
   Acting Director
   S.N. Bose National Centre for Basic Sciences
   Kolkata

Prof. P. K. Kaw, Prof. N. Kumar and Prof. G. K. Mehta have been nominated as members of the Governing Body for a period of 5 years effective July 2002.

Finance Committee

The following members constituted the Finance Committee during 2005-06:

1. **Professor A. Mookerjee** — *Chairman*
   Acting Director, SNBNCBS, Kolkata
2. **Professor R. K. Choudhury** — *Member*
   Bhabha Atomic Research Centre
   Mumbai
3. **Professor R. Ramachandran** — *Member*
   Raja Rammana Fellow
   Poona University, Poona
4. **Joint Secretary & Financial Adviser or his Nominee,** — *Member*
   DST, New Delhi
5. **Registrar** — *Member-Secretary*
   SNBNCBS, Kolkata

Note : The Governing Body had nominated Prof. Arup Raychaudhuri as a member of the Finance Committee for a period of five years staring June 2000. However, Prof. Raychaudhuri has joined S. N. Bose National Centre on 22 June 2004 as 'Senior Professor'. GB nominated Prof. R. K. Choudhury , BARC, Mumbai in place of Prof. Arup Raychowdhury as Member, Finance Committee for a period of five years, starting September 2004.

Building Committee

The members of the Committee for the year 2005-2006 are :

1. **Professor A. Mookerjee** — *Chairman*
   Acting Director, SNBNCBS, Kolkata
2. **Professor Bikash S. Sinha** — *Member*
   Director, Saha Institute of Nuclear Physics
   & Director, Variable Energy Cyclotron Centre
3. **Prof. H. S. Mani** — *Member*
   Visiting Professor, IMSc.,Chennai &
   Ex-Director, HRI, Allahabad
5. **Mr. Pratap Singh** — *Member*
   Chief Engineer (EZ-1),CPWD
6. **Shri Ranadhir Dey** — *Member*
   Project Manager, (SO/SG), VECC, Kolkata

Academic Programme Advisory Committee

During the year 2005-2006, the Academic Programme Advisory Committee of the Centre consisted of the following members:

1.	**Professor S. K. Joshi** *NPL* *New Delhi*	*Chairman*
2.	**Professor K. B. Sinha** *ISI* *New Delhi*	*Member*
3.	**Professor R. Nityananda** *Director, NCRA* *Pune*	*Member*
4.	**Professor N. Sathyamurthy** *Chemistry Department, IIT* *Kanpur*	*Member*
5.	**Professor A. K. Sood** *Divisional Chairman, Physical Sciences* *IISc., Bangalore*	*Member*
6.	**Professor A. Mookerjee** *Acting Director, SNBNCBS* *Kolkata*	*Member*
7.	**Professor A. K. Raychaudhuri** *Sr. Professor & Dean (Faculty)* *SNBNCBS, Kolkata*	*Member*
8.	**Dr. R. Banerjee** *SNBNCBS, Kolkata*	*Member*
9.	**Dr. S. S. Manna** *SNBNCBS, Kolkata*	*Member*
10.	**Dr. N. Nayak** *SNBNCBS, Kolkata*	*Member*

Note : The APAC constituted by the GB has come into vogue from June 2001. GB nominated Prof. S. K. Joshi as the new Chairman for APAC, for a period of five years from September 2004.

The Staff and the Students

The Faculty

Name	*Designation*	*Ph. D. from*	*Year*	*Area of Research*
Abhijit Mookerjee	Sr. Professor & Acting Director (w.e.f. April 2005)	University of Cambridge	1973	Physics of Materials
Sushanta Dattagupta	Professor	Brookhaven National Laboratory	1973	Structure and Dynamics of Condensed Matter Physics
Arup Raychaudhuri	Sr. Professor	Cornell University, Ithaca	1980	Experimental Condensed Matter
Sandip K. Chakrabarti	Professor	University of Chicago	1985	Astrophysics
Subodh Kumar Sharma	Associate Professor	S. I. N. P. *(Universiy of Calcutta)*	1977	Light Scattering
Nilakantha Nayak	Associate Professor	I. I. T., Kharagpur	1978	Quantum Optics and Laser Physics
Rabin Banerjee	Associate Professor	S. I. N. P. *(University of Calcutta)*	1988	Quantum Field Theory
Anita Mehta	Associate Professor	University of Oxford	1986	Soft Condensed Matter and Complex Systems
Subhrangshu Sekhar Manna	Associate Professor	S. I. N. P. *(University of Calcutta)*	1987	Statistical Mechanics
Debashis Gangopadhyay	Reader	S. I. N. P. *(Jadavpur University)*	1988	Quantum Field Theory
Srilekha Banerjee	Reader	University of Calcutta	1982	Soft Condensed Matter
Samir Kumar Paul	Reader	I. O. P. B. *(Utkal University)*	1989	Mathematical Physics
P. Singha Deo	Reader	I. O. P. B. *(Utkal University)*	1996	Mesoscopic Systems
M. Sanjay Kumar	Reader	University of Hyderabad	1989	Quantum Optics
Manu Mathur	Reader	I. M. Sc. *(University of Madras)*	1993	Quantum Field Theory & QCD

Name	*Designation*	*Ph. D. from*	*Year*	*Area of Research*
Rudra Prakash Malik [*on lien w.e.f. Nov '05*]	Reader	I. O. P. B. *(Utkal University)*	1989	Quantum Field Theory
Surajit Sengupta	Reader	I. I. Sc., Bangalore	1992	Theoretical Condensed Matter Physics
Sugata Mukherjee	Reader	Frei Universitat, Berlin	1985	Physics of Materials
Amitabha Lahiri	Reader	Syracuse University	1991	Quantum Field Theory
Ranjan Chaudhury	Reader	T. I. F. R. *(University of Mumbai)*	1988	Condensed Matter Theory
Pratip K. Mukhopadhyay	Reader	I. I. Sc., Bangalore	1989	Experimental Condensed Matter Physics
Gautam Gangopadhyay	Reader	I. A. C. S. *(Jadavpur University)*	1993	Chemical Physics
Biswajit Chakraborty	Reader	I. M. Sc *(University of Madras)*	1993	Quantum Field Theory
Archan S. Majumdar	Reader	University of Delhi	1994	Foundations of Quantum Theory and Cosmology
Jaydeb Chakrabarti	Reader	I. I. Sc., Bangalore	1995	Soft Condensed Matter and Complex Systems
Kalyan Mandal	Reader	I. I. T., Kharagpur	1994	Experimental Condensed Matter
Tanusri Saha Dasgupta	Reader	SNBNCBS *(University of Calcutta)*	1995	Physics of Materials
Partha Guha	Reader	University of Oxford	1996	Mathematics
Priya Mahadevan	Reader *(joined '05)*	I. I. Sc., Bangalore	1998	Condensed Matter Physicss
Anilesh Mohari	Faculty Fellow	I. S. I., Delhi	1992	Mathematics
Ranjit Biswas	Faculty Fellow	I. I. Sc., Bangalore	1995	Physical Chemistry/ Chemical Physics

Name	*Designation*	*Ph. D. from*	*Year*	*Area of Research*
Samir K. Pal	Faculty Fellow	Jadavpur University	2000	Biophysics and Spectroscopy
P. A. Sreeram	Faculty Fellow	I. O. P., Bhubaneswar	1999	Quantum Many Body Theory
Subhashis Sinha	Faculty Fellow *(joined February'06)*	I. M. Sc., Chennai	2001	Condensed Matter Physics (Theory)
Rina Das	Scientific Officer 'D' *(In-charge, Braille Project)*			
Sukumar Mallick	Academic Programme Coordinator & Administrative Officer *(till Sept '05)*	IIT Kharagpur	1971	Geohydrology and Geomorphology

Visiting Scientists

Binayak Dutta-Roy, Visiting Scientist

K. Srinivasan , Visiting Scientist

B. B. Bhattacharya, Emeritus Professor

B. M. Deb, Vikram Sarabhai Research Professor

Sukumar Mallick , KVPY Project *(joined : Oct '05)*

Alak K. Majumdar *(joined : Feb '06)*

Research Associates

Manideepa Mitra	*Condensed Matter Physics*
Sumita Datta	*Statistical Mechanics*
Uday Kumar	*Expt. Cond. Matter Physics*
Molly De-Raychaudhury	*Condensed Matter Physics*
Barnali Ghosh(Saha)	*Nanophysics*
Nilotpal Ghosh	*Nanophysics (left : February 2005)*
Anindya Das	*Nanophysics*

Library

V. K. Thomas - *Librarian*

Amitabha Bhattacharya, *Trainee*

Computer-in-Charge

Surajit Sengupta

Administrative, Technical and Auxiliary Staff

Somesh C. Jhingan	*Registrar (joined : Nov '05)*
Apurba Kanti Sarkar	*SO (Accounts)*
Sunish Kumar Deb	*PA to Director*
Shohini Majumder	*Administrative Assistant (Communications)*
Dipti Prakash Banerjee	*Office Superintendent*
Sukanta Mukherjee	*Assistant(General)*
Sanad Kumar Shukla	*Assistant*
Sirsendu Ghosh	*Senior Stenographer*
Santosh Kumar Singh	*Stenographer*
Tapan Kumar Sen	*Upper Division Clerk*
Jaydeep Kar	*Jr. Assistant*
Prasenjit Talukdar	*Jr. Assistant*
Shiba Prasad Nayak	*Pump Operator*
Aditya Pal Choudhury	*Project Assistant*
Gopal Chandra Ghosh	*Driver*
Sushanta Kumar Biswas	*Driver*
Bijoy Kumar Pramanik	*Guest House Attendant*
Arun Kumar Bhattacharya	*Library Stack Attendant*
Bhupati Naskar	*Library Stack Attendant*
Pradip Kumar Bose	*Helper*
Partha Chakraborty	*Helper*
Partha Mitra	*Attendant*
Ratan Acharya	*Attendant*
Swapan Ghosh	*Attendant*

Engineering

B. L. Bhattacharyya	*Engineer*
Shibaji Das	*Jr. Engineer (Civil)*
Bibhas Kumar Shikdar	*Jr. Enginner (Electrical)*

Personnel with Temporary Status

Sudhanshu Chakraborty, *Attendant* (Administration)

Biman Roy, *Attendant* (Despatch Section)

Sukamal Das, *Attendant* (Maintenance)

Dulal Chatterjee, *Attendant* (Maintenance)

Somnath Roy, *Attendant* (Accounts)

Nimai Naskar, *Gardener*

Biswanath Das, *Gardener*

Rabi Orao, *Gardener*

Hiralal Das, *Cleaner*

Ramchandra Das, *Cleaner*

Motilal Das, *Cleaner*

Prakash Das, *Cleaner*

Kartick Das, *Cleaner*

Students

Senior Research Fellows

Anuj Nandi	*Astrophysics# (left: April 2005)*
Atishdipkar Chakrabarti	*Electronic Structure##*
Dipankar Rana	*Chemical Physics***
Rumani Karmakar	*Statistical Physics (left: February 2006)*
Santabrata Das	*Astrophysics# (left: February 2006)*
Sumana Banerjee	*Chemical Physics*
Abhishek Choudhuri	*Condensed Matter Physics (left: March 2006)*
Manirul Md. Ali	*Foundations of Quantum Mechanics*
Suvankar Chakraborty	*Condensed Matter Physics*
Mukul Kabir	*Condensed Matter Physics**

Monodeep Chakrabarti	*Condensed Matter Physics**
Ram Narayan Deb	*Quantum Optics****
Aftab Alam	*Condensed Matter Theory*
Ankush Sengupta	*Soft Condensed Matter*
Debashis Chaudhuri	*Soft Condensed Matter Physics*
Kuldeep Kumar	*High Energy Physics (left: December '05)*
Soumen Mondal	*Astrophysics*
Biplab Ghosh	*Quantum Information Theory(left:March'06)*
Jayee Bhattacharya	*Soft Condensed Matter Physics*
Malay Bandopadhyay	*Dissipative Phenomena*
Nupur Mukherjee	*Cosmology*
Subarna Mitra	*Magnetic Nanomatereial*
Sudeshna Samanta	*Theoretical Astrophysics*
Suman Sinha	*Magnetism & Magnetic Materials*
Abhishek Pandey	*Experimental Condensed Matter*
Debabrata Dutta	*Nonlinear Dynamics & Chaos*
Manas Kumar Roy	*Nonlinear Accustics*
Mrinal Kanti Bera	*Experimental Condensed Matter*
Mutta Venkata Kamalakar	*Nanoscience*
Navin Chandra	*Biophysics*
Sunandan Gangopadhyay	*Quantum Field Theory*
Shashank Shalgar	*Particle Physics (left: August '05)*
Swati Bhattacharya	*Statistical Physics*
Kartick Tarafdar	*Condensed Matter Physics*
Rupa Sarkar	*Biophysics*
Tuhin Pradhan	*Chemical Physics*
Sudipta Samanta	*Biophysics*
Anjan Kumar Nandi	*Quantum Field Theory*
Arindam Ghosh Hazra	*Quantum Field Theory*
Badiur Rahman	*Condensed Matter Theory*
Dipanjan Chakraborty *(Left)*	
Kunal Bhattacharya	*Condensed Matter Theory*

Manoj Kumar Yadav	*Condensed Matter Physics*
Manoranjan Ghosh	*Nanophysics*
Sanjay Saha *(Left)*	
Sourav Samanta	*Quantum Field Theory*

 # working in projects under Dr. Sandip K. Chakraborty
working as an external student under Prof. Abhijit Mookerjee
** working in the Warwick Project under Prof. Abhijit Mookerjee*
*** working as External Candidate under Dr. G. Gangopadhyay since October 2000*
**** working as an external student under Dr. N. Nayak*

Junior Research Fellows

Ashis Bakshi

Chandrasekhar Chatterjee

Saikat Chatterjee

Santosh Roy

Soma Das

Tapati Sarkar

P. Anil Kumar

Ajay Kumar Shaw

S. Shankara Narayan

Mitali Banerjee

Hemant Kumar Kashyap

Shailesh G. Kulkarni

Soumendu Dutta

Arnab Saha

Arya Paul

Bipul Das

Sagar Chakraborty

Saptarshi Mitra

Subrata Sarkar

Tamaghna Kanti Das

Manoj Raula *(joined: Feb '06)*

Post M.Sc. Students (Batch: 2005)

Sourav Bhattacharya

Harun Al Rashid Gazi

Moshior Rahaman

Dwipesh Majumdar

Debapriya Banerjee

Roby Cherian

Swarup Saha

Sk. Nurul Haque *(joined: July'05; left: Feb'06)*

Post B. Sc. Integrated Ph. D. Students (4th batch: 2004)

Irfan

Niraj Kumar Chaubey

Shreemoyee Ghosh

Post B. Sc. Integrated Ph. D. Students (5th batch: 2005)

Anirban Mitra

Abhinav Kumar

Saurav Dutt

Manish Kumar Sahai

Vikash Kumar Mishra

Rasidul Islam

Shantanu Shankar Bagchi

Post B. Sc. Integrated Ph. D. Students in Chemical Sciences(1st batch: 2005)

Mainak Sadhukhan

Satamita Samanta

Sucheta Sengupta

Ramprasad Misra

Debashis Mondal

Sudarson Sekhar Sinha

Priyaranjan Banerjee

Rahul Maitra

Akhilesh Chandra Joshi

Abhijit Poddar

Facilities

Computer Centre

The Computer Centre continued to serve the computational needs of the Centre in the past academic year 2005 - 2006. The following were the hihlights of the activities at the Computer Centre during the past year.

1. The internet line was upgraded from 1:4 512 Kbps to a dedicated 1:1 1 Mbps connection to the external world.

2. A new web and email server has been procured which world make our website more accessible from outside.

3. Three new workstations were procured under various projects.

4. A separate web server has been procured for hosting the website of the Unit for Nano Science and Technology.

5. The LAN was extended to give internet connections to severalplaces in the main building and the guest house building.

6. An additional 2x20 KVA UPS with state of the art parallel redundancy has been procured and commissioned.

Surajit Sengupta
Computer-in-Charge

Library

- The SNB Library, established in 1986, is a special library in Basic Sciences. Its collection comprises of documents (monographs, e-books, DDs, A-Vs etc.) in the fields of Physics, Mathematics, Chemistry, Electronics, Nanoscience & Technology, Computer Science, and History of Science etc. It is primarily intended for the staff members, research scholars and students of S.N.Bose National Centre for Basic Sciences. However, outside users viz., professionals, bona fide research scholars, bona fide students etc. , who wish to make use of the Library are allowed.

- The Library subscribed to 288 journals (in various forms like online alone, online plus print and print alone). On the top of that, 13 journals are received free. The present budget provision for the a Library is around Rs 2 crores. It added about 1,200 books (spending about 41.50 lakhs) into its stock during the year under report.

- Provision is also made for general reading. Books in social sciences and humanities (in English, Hindi and Bengali), and 12 magazines and 9 newspapers are purchased towards this end. The institutional membership at the British Council Library (BCL) also enhances this service.

- The Library is fully computerized with the installation of LIKBSHS 4 (on Linux platform). A server (Pro Liant ML350G2 base machine) and 10 PCs multimedia, scanner, colour printer, lamination machine, and a CD-Writer are also apart of the set-up. The electronic databases at the Library cover monographs, journals, and annual reports, audio-visuals and CD-ROMs. The Library utilizes two additional softwares like WINISIS (for Bose Digital Archive) and Greenstone (for Digital Library).

- The Library is a member of three consortia viz., INDEST, FORSA, and Mathscinet. It has also inter-library loan facility with ISI Library, Kolkata, FORSA members, and inter-library cooperation with SINP Library, Salt Lake.

- The various services offered by the Library are lending, reference, newspaper reading, photocopying, sprial binding, lamination etc. The Library provides for photocopying of library materials to supplement the lending and reference service. Above 12,000 pages have been photocopied during the year.

S.N.Bose Digital Archive

- The archive on the life and works of S. N. Bose was set up in the SNB Library, in 2002 in the presence of relatives and admirers of S. N. Bose. The archive contains manuscripts, documents and personal effects of Bose. S. N. Bose Digital Archive, readied in 2005, is a total e-archive. One can consult catalogues, read documents/books, view photographs/visuals/documentary and listen to his voice or recitals.

- The Library is open 6 days a week, 12 hours a day. The Library hours are :

  Monday - Friday: 8.00 am to 8.00 pm
  Saturday: 9.00 am to 5.30 pm

V. K. Thomas
Librarian

Guest House

The Centre has it's own modern Guest House and cafeteria located within the premises. Apart from serving regular meals to the staff members of the Centre as well as visitors, the cafeteria also serves as a venue for hosting lunches and high teas on special occasions, seminars, conferences etc. of the Centre. There are 04 fully furnished air-conditioned suites with attached baths and kitchenettes, 15 single, 06 double fully air-conditioned furnished rooms and 21 fully furnished non-air-conditioned rooms with attached baths in the Guest House. The Guest House is catered with 24 hrs STD / ISD facilities with attachment conferencing system including continuous attendance by experienced persons manned for the purpose.

Sanad K. Shukla
Guest House In-Charge

Experimental Facilities at the Centre

Name of Equipment
1. UV-VIS Spectrophotometer
2. Fluorimeter
3. Picosecond Resolved TCSPC system
4. FTIR spectrometer with time resolved step-scan facility
5. Dynamic Light Scattering (DLS) Instrument with 0.6 nm resolutions
6. X-ray diffractometer with SAXS facility
7. Ultrahigh purity Water purifier
8. LB Film Maker
9. Mask Aligner
10. Electrical Network Analyzer
11. Vibrating Sample Magnetometer (VSM)
12. RF/DC Sputtering Unit
13. 4.2 K Pulse tube Cryo-refrigerator with optical windows

Welfare Measures and Language Policy

The Centre is continously making utmost effort to improve its general welfare and security measures, languauge policy and training programmes as per GOI order/notification published from time to time.

The Centre has constructed a Common Room, Tennis and Badminton Courts and Vollyball Court to promote indoor/outdoor games extensively. Matches and indoor competitions are organised at periodic intervals. About 250 various types of trees have been planted to maintain ecological and environmental balance. A small green house has also been developed for planting of seasonal flowers etc. to cater to the needs of beautification of Centre's lawn. Along the boundary wall 4 feet wide moorum pavement has been provided for security purpose as well as for constitutionals. The Center provides transport facilities to all its staff members and students for pick-up and drop services as well as for all other official jobs. A car shed for parking Centre's vehicles has also been constructed keeping security considerations in mind.

The Centre has introduced a Contributory Medical Scheme, which would extend medical support to all permanent, temporary, retired , visiting members of the Centre and their dependents. Both hospitalisation and general day-to-day medical requirements will covered under the scheme. A number of renowned hospitals and diagnostic centres are within the network of the scheme. The Centre has also set up a medical unit with a doctor visiting the campus daily.

Periodically the Centre sends employees for various training programmes in the interest of the Centre as well as to improve the work efficiency and career prospects. As per GOI RAJBHASA programme, the Centre sends employees by rotation to attend Hindi classes. Some of the employees have also attended the "RAJBHASA" conference in Delhi.

The Centre maintains GOI reservation policy in recruitment and promotion.

Acronyms

ASICTP	: The Abdus Salam International Centre for Theoretical Physics, Trieste (Italy)
AICTE	: All India Council for Technical Education, New Delhi
AMRS	:
BARC	: Bhaba Atomic Research Centre, Mumbai
BHU	: Benaras Hindu University, Varanasi
BI	: Bose Institute, Kolkata
BLTP	: Bogoliubov Laboratory of Theoretical Physics, Dubna (Moscow)
B.Sc.	: Bachelor of Science
CKM Lab	: C. K. Majumdar Laboratory, S. N. Bose National Centre
CMDAYS	: Condensed Matter Days
CPWD	: Central Public Works Department
CSIR	: Council for Scientific and Industrial Research, New Delhi
CSP	: Centre for Space Physics, Kolkata
CU	: Calcutta University, Kolkata
DST	: Department of Science and Technology
DISCOMB	: Disorder, Complexity and Biology
FORSA	: Forum for Resource Sharing in Astrophysics
GB	: Governing Body
HEP Group	: High Energy Physics Group
HRI	: Harish-Chandra Research Institute, Allahabad
IACS	: Indian Association for the Cultivation of Science, Kolkata
ICONSAT	: International Conference on Nano Science and Technology
IIPC	:
IISc	: Indian Institute of Science, Bangalore
IITB	: Indian Institute of Technology , Mumbai (Pawai)
IMSc	: Institute of Mathematical Sciences, Chennai
INDEST	: Indian National Digital Library in Enginnering Sciences & Technology
INSA	: Indian National Science Academy, New Delhi
IOP	: Institute of Physics, Bhubaneswar
ISI	: Indian Statistical Institute, Kolkata
ISNA	: Indian Science News Association
ISRO	: Indian Space Research Organisation, Bangalore
IUCAA	: Inter-University Centre for Astronomy & Astrophysics, Pune
IUC-DAEF	: Inter-University Consortium-Department of Atomic Energy Facilities, Kolkata
IUPAP	: International Union of Pure and Applied Physics,
JEST	: Joint Entrance Screening Test
JINR	: Joint Institute of Nuclear Research, Dubna (Moscow)
JNCASR	: Jawaharlal Nehru Centre for Advanced Scientific Research
JNU	: Jawaharlal Nehru University, New Delhi
JSPS	:
KIAS	:
KFA	:
LCMP	: Laboratory for Condensed Matter Physics
LIBSYS	: The library software installed at SNB Library
MNRAS	:
M.Sc	: Master of Science
NCBS	: National Centre for Biological Sciences, Bangalore
NCRA	: National Centre for Radio Astrophysics, Pune
NEERI	: National Environmental Engineering Research Institute, Nagpur
NISTADS	: National Institute of Science, Technology and Development Studies, New Delhi
NGPE	: National Graduation Physics Examination
NPL	: National Physical Laboratory, New Delhi
PRL	: Physical Research Laboratory, Ahmedabad
RCI	: Rehabilitation Centre of India, New Delhi
RRI	: Raman Research Institute, Bangalore
RSIC	:
SERC	: Science and Engineering Research Council
SINP	: Saha Institute of Nuclear Physics, Kolkata
SNBNCBS	: Satyendra Nath Bose National Centre for Basic Sciences, Kolkata
SOHO	: Solar and Heliospheric Observatory
STATPHYS	: Statistical Physics
SUNY	:
TIFR	: Tata Institute of Fundamental Research, Mumbai
TPSC	: Theoretical Physics Seminar Circuit
TRACE	: Transition Region and Coronal Explorer
UGC	: University Grants Commission
UPEI	:
VECC	: Variable Energy Cyclotron Centre, Kolkata
WBUT	: West Bengl University of Technology, Kolkata

TABLE OF CONTENTS

ENGLISH – PART A

ENGLISH – PART B

English

PART - A

English

PART - B

Personal Profile

I. Faculty

Rabin Banerjee

Publications

Journals

1. **Rabin Banerjee** and Kuldeep Kumar (2005), Seiberg-Witten maps and commutator anomalies in noncommutative electrodynamics, *Phys. Rev. D* 72, 85012.

2. **Rabin Banerjee,** Pradip Mukherjee and Anirban Saha (2005), Bosonic p-brane and ADM decomposition, *Phys. Rev. D* 72, 066015.

3. **Rabin Banerjee** and Shinichi Deguchi (2006), A BRST gauge fixing procedure for Yang-Mills theory on sphere, *Phys. Lett. B* 632, 579.

Teaching programme

1. Mathematical Methods II, *Post-BSc Integrated Ph.D course at SNBNCBS, January - April 2006.*

2. Constrained hamiltonian analysis: a pedagogical introduction, *Autumn school at Presidency college, November 2005.*

3. Introduction to noncommutative field theory, *Nihon University, Tokyo, June 2005.*

Supervision of students

i) Ph.D. Students

Kuldeep Kumar, Jadavpur University (left in January 2006 and joined as Lecturer, Physics Department Punjab University, Chandigarh).

ii) Students doing Ph.D

1. Saurav Samanta, Jadavpur University.
2. Shailesh Kulkarni, Not yet registered

Talks given

1. *Seiberg-Witten type maps for currents and anomalies in noncommutative gauge theories,* at
   i) Physics Department Nihon University, Tokyo, June 2005.
   ii) RIKEN, Tokyo, June 2005.
   iii) KEK High Energy Physics Lab. Tsukuba, Japan, June 2005.
   iv) Sungkyunkwan University, Korea, July 2005.
2. *Deformed symmetries and noncommutative gravity,* Seoul National University, Seoul, July 2005.
3. *Deformed symmetries in noncommutative gauge theories,* International Conference on Noncommutative Geometry and Quantum Physics, SNBNCBS, 4 January 2006.

Other educational/academic activities

i) Membership of committees / bodies

1. Member of the Expert Committee (PG studies) Presidency College, Kolkata.
2. Convener, International Conference on Noncommutative Geometry and

Quantum Physics, SNBNCBS, 4 -10 January 2006.

ii) Awards/Honours received

1. Awarded a visiting professorship at Institute of Quantum Science, Nihon University, Tokyo, Japan, June 2005.
2. Awarded a visiting professorship at the Centre for Theoretical Studies, Physics Department, Seoul National University, Seoul, Korea, July 2005.

Bimalendu B. Bhattacharya

Publications

i) Journals

Shalivahan and **Bimalendu B. Bhattacharya** (2005), Electrical anisotropy of asthenosphere in a region of window to the mantle underneath Eastern Indian Craton, *Physics of the Earth and Planetory Interiors*, 152, 43 - 61.

Supervision of students

Students received Ph D

Rajib K. Sinharay, Thesis on *Application of Magnetotelluric (MT) Method for the Study of Geothermal Resources* in Bakreswar, Eastern India, Indian School of Mines, Dhanbad, 2006.

Other academic / educational activities

i) Visits, conferences, symposia

1. Attended *Indian National Academy of Engineering (INAE) convention*, Bangalore, 10 - 11 December 2005.
2. Chaired a Technical Session on *Non-Seismic Geophysical Methods - I*, Kolkata - 2006 in the 6th *International Conference and Exposition in Petroleum Geophysics* held at Science City, Kolkata, 9-11 January 2006, organised by the Society of Petroleum Geophysicists, India.
3. Examined Ph D thesis of a student of the Department of Physics and Electronics, University of Rajshahi, Rajshahi, Bangladesh.
4. Guest Faculty, Bengal Engineering and Science University, Shibpur, Howrah, West Bengal.

ii) Membership in committees / bodies

1. Member, Project Advisory and Monitoring Committee (PAMC) of Deep Continental Studies (DCS) of DST, Govt. of India.
2. Member, Monitoring Commitee, CSIR Network Project on Coastal Placer Mining.
3. Mentor (Advisor) Technical Education Quality Education Programme (TEQIP) of World Bank for State Project Facilitation Unit - West Bengal (SPFU-WB) on behalf of National Project Implementation Unit (NPIU), MHRD, Govt. of India.

Awards / Honours received

Indian National Academy of Engineering (INAE) Distinguished Professor Chair for 2006 - 2011 in S. N. Bose National Centre for Basic Sciences, Kolkata.

Ranjit Biswas

Publications

Journals

K. Dahl, **R. Biswas**, N. Ito and M. Maroncelli (2005), Solvent dependence of the spectra and kinetics of excited-state charge transfer in three (Alkylamino)benzonitriles, *Journal of Physical Chemistry B*, 109, 1563.

Collaborative research & project work

A. Projects

1. *Electron Transfer in Electrolyte Solutions*, Ranjit Biswas, S. N. Bose National Centre for Basic Sciences, funded by the Council of Scientific & Industrial Research (CSIR).

   Many electron transfer processes relevant to biology and inorganic chemistry occur in electrolyte solutions rather than in neat solvents. In such situations, the presence of mobile ions can markedly influence the energetics and dynamics of electron transfer and related reactions. The aim is to carry out a comprehensive study of electrolyte effects on charge transfer reactions occurring in solution phase by using spectroscopic technique (both steady state and time dependent) and also *complement* the experimental results with simulation predictions wherever possible. TICT (twisted intra-molecular charge transfer) molecules as model systems to carry out such investigations.

2. *Solvation in Near Critical Fluids:* Experiments and Simulation, Ranjit Biswas, S. N. Bose National Centre for Basic Sciences, funded by the Department of Science and Technology.

The project focuses on the experimental and simulation studies of solvation in room temperature near critical solvents. The general questions to be investigated : How do the long wavelength and slow fluctuations in near critical solvents affect the solvation processes? How does the friction on a solute differ in such solvents from that in a conventional solvent? Steady state spectroscopic techniques will be employed to investigate the structure of solvent around a solute in supercritical fluids (SCF). The experimental studies will be supplimented by computer simulations that in addition will provide dynamical information. We shall carry out Simulation studies for model and realistic systems will be carried out and extended to subcritical regime as well.Such studies will help to develop a total understanding of the solvation processes and related phenomena in solvents in the vicinity of the critical point.

B. Collaborative Research

Structural Elucidation of Reverse Microemulsion by Fluorescence Spectroscopy, S. Mahiuddin, RRL, Jorehat, Institute funding.

Teaching programme

i) *Experiments in Physical Chemistry*, Post-B.Sc Integrated Research Chemical Sciences at SNBNCBS, July - December 2005.

ii) *Experiments in Physical Chemistry*, Post-B.Sc Integrated Research Chemical Sciences, SNBNCBS, January - May 2006.

Supervision of students

i) Students doing Ph. D

a) Tuhin Pradhan, (UGC fellow, registerd with Jadavpur University)

b) Hemant Kashyap (registration to be done)

c) Harun al-Rashid Gazi

d) Manoj K. Raula (CSIR Fellow, Registration to be done)

ii) Ph. D. students

Dr. Nashiour Rohman (CSIR Project, SNBNCBS)

Other academic/educational activities

Membership in committees/bodies

i) Life-Member, IACS Library

ii) Convenor of PBIR Chemical Sciences.

Jaydeb Chakrabarti

Publications

i) Journals

1. Subramania C., Pradeep T. and **Chakrabarti J.** (2005), Flow induced potential in nano-particle assemblies, *Physical Review Letters,* 95, 164501.
2. **Chakrabarti J.,** Chakrabarti S. and Lowentt (2006), Short ranged attraction and long ranged repulsion between two solute particles in a sub-critical liquid solvent, *JPCM (Letter)*, 18, 181.

Supervision of Students

Mr. Sudipta Samanta (SRF)

Mr. Navin Chandra (SRF)

Talks given

Ultrafast photo-modulation of ligand binding to genomic DNA at Institute for Theoretische Physik, Duesseldorf, Germany (November 2005) & FOM Institute, Amsterdam, the Netherlands (November 2005).

Other academic activities

Visit, Conference, Symposium

1. Visit to Prof. H. Lowen's group, Institute for Theoretische Physik, Duesseldorf, Germany (November-December 2005).
2. Participate and taken part in organization of RNA meeting, Kolkata (January 2006).

S. K. Chakrabarti

Publications

i) Journals

1. Samir Mandal and **Sandip K. Chakrabarti** (2005), Signatures of accretion shocks in broadband spectrum of advective flows around black holes, *Intl. J. Mod. Phys. D,* 14, 933.
2. Sabyasachi Pal, **Sandip K. Chakrabarti**, K. Goswami, A. Nandi, B. G. Ananda Rao, S. Mondal, (2005), Results of recent multi-wavelength campaign of SS433, *ChJAA*, 5,69.
3. Samir Mandal and **Sandip K. Chakrabarti** (2005), Accretion shock signatures in the spectrum of two-temperature advective flows around black holes, *Astron. Astrophys.*, 434, 839.
4. **Sandip K. Chakrabarti** and S. Mondal (2005), A modified gravitational potential

to study particles and fluids around a rotating black hole in the equatorial plane, *Ind. J. Phys*., 88 (11), 1237.

5. **Sandip K. Chakrabarti**, B.G. Anandarao, S. Pal, S. Mondal, A Nandi, A. Bhattacharyya, S. Mandal, R. Sagar, J.C. Pandey, A. Pati, and S.K. Saha (2005), SS 433: Results of a recent multi-wavelength campaign, *Mon. Not. R. Astron. Soc.,* 362, 957.
6. Anuj Nandi, **Sandip K. Chakrabarti**, T. Belloni and P. Goldoni (2005), X-ray observation of SS 433 with RXTE, *Mon. Not. R. Astron. Soc.,* 359, 629.
7. **Sandip K. Chakrabarti**, M. Saha, R. Khan, S. Mandal, K. Acharyya, and R. Saha (2005) Possible detection of ionospheric disturbances during Sumatra-Andaman Islands earthquakes in December, *Ind. J. Radio and Space Phys.*, 34, 314.
8. **Sandip K. Chakrabarti** (2005), Numerical simulations reveal the origin of QPOs in black hole candidates, *ChJAA*, 5, 27.
9. **Sandip K. Chakrabarti**, Anuj Nandi, A. Chatterjee, A. Choudhury, U. Chatterjee (2005), Class transitions and two component accretion flow in GRS 1915+105, *Astron. Astrophys.,* 431, 825.
10. K. Acharyya, **Sandip K. Chakrabarti**, S. Chakrabarti (2005), Molecular hydrogen formation during interstellar cloud collapse, *Mon. Not. R. Astron. Soc.*, 361, 550.
11. **Sandip K. Chakrabarti** (2005), Class transitions in black holes, *ChJAA*, 5, 33.
12. **Sandip K. Chakrabarti** (2005), A recent multi-wavelength campaign to observe the micro-quasar SS433, *Bull. Astron. Soc. India*, 33 (2), 109.
13. Sabyasachi Pal and **Sandip K. Chakrabarti** (2005), A GHz flare in a quiescent black hole and a determination of the mass accretion rate, *ChJAA*, 5, 331.
14. **S. K. Chakrabarti**, A. Nandi, D. Debnath, R. Sarkar and B.G. Datta, (2005), Propagating Oscillatory Shock Model for QPOS in GRO J1655-40 during the March 2005 Outburst, *Ind. J.Phys*. B78, 1.
15. Sabyasachi Pal, **S. K. Chakrabarti**, A. Kraus and S. Mandal (2006), Broadband Radio Spectrum of SS433, *Bul. Astron. Soc. Ind,* 34, 1.

ii) Proceedings

1. K. Acharyya, **Sandip K. Chakrabarti**, S. Chakrabarti, Ankan Das (2005), Production of complex bio-molecules in collapsing interstellar cloud, *in Astrochemistry throughout the Universe: Recent Successes and Current Challenges/ Proceedings of IAU Symposium no. 231,* (Eds) Dariusz C. Lis, Geoffrey A. Blake and Eric Herbst, Cambridge Univ. Press, 155.
2. **Sandip K. Chakrabarti** (2006), Role of Disk Models in identifying astrophysical black holes in *General Relativity and Gravitation,* Eds. M. Novello and S.P. Bergliaffa, p. 559, World Scientific Co.: Singapore.
3. S. Mandal and **Sandip K. Chakrabarti** (2006), Spectral properties of a two

component and two temperature advective flow, in *General Relativity and Gravitation,* Eds. M. Novello and S.P. Bergliaffa, World Scientific Co., Singapore.

4. **Sandip K. Chakrabarti**, K. Acharyya and D. Molteni (2006), in *General Relativity and Gravitation,* Eds. M. Novello and S.P. Bergliaffa 1375, World Scientific Co., Singapore.

5. **Sandip K. Chakrabarti**, A. Nandi and A. R. Rao (2006), Spectral signatures of winds from accretion disks around black holes, in *General Relativity and Gravitation*, Eds. M. Novello and S. P. Bergliaffa, World Scientific Co., Singapore.

6. **Sandip K. Chakrabarti**, A. Nandi, S. Pal, B.G. Anandarao, S. Mandal (2006), Photometric evidence of bullets in SS433 jets in *General Relativity and Gravitation*, Eds. M. Novello and S.P. Bergliaffa, p. 1324, World Scientific Co., Singapore.

7. Prasad Basu and **Sandip K. Chakrabarti** (2005), Gravitational wave emission from black holes surrounded by massive disks in *Proceedings of the Annual Meeting of the Astronomical Society of India*, *BASI*, 33, 387.

8. Ankan Das, **Sandip K. Chakrabarti**, Sonali Chakrabarti, and Kinsuk Acharyya (2005), Monte-Carlo simulation of molecular hydrogen formation on grain surfaces in *Proceedings of the Annual Meeting of the Astronomical Society of India, BASI*, 33, 390.

9. Sudeshna Samanta, Soumen Mondal, **Sandip K. Chakrabarti**, (2005), Pseudo-Kerr Geometry in *Proceedings of the Annual meeting of the Astronomical Society of India, BASI*, 33, 386.

10. Soumen Mondal, Sudeshna Samanta and **Sandip K. Chakrabarti**, 2005, Pseudo-potential approach for astrophysical fluid dynamics study in *Proceedings of the Annual Meeting of the Astronomical Society of India, BASI*, 33, 386.

iii) Books

Sandip K. Chakrabarti, Compact Stars (Block 3, Unit 11), The Milky Way (Block 3, Unit 12), Active Galaxies (Block 4, Unit 14), *IGNOU*, New Delhi, 2006.

iv) Book Reviewed

Edwin Hubble-Mariner of the Nebulae by Gale E. Christianson for Indian Journal of Physics, 79 (12), 1427, 2005.

Collaborative research & project work

1. *Analytical modeling of the quasi-periodic oscillations in black hole candidates*, funded by Indian Space Research Organization, January 2006 - December 2008

   Matter undergoing black hole accretion emits soft and hard X-rays. Out of this, the hard X-ray intensity is found to oscillate at some amplitude. Earlier, it was shown that the oscillation of X-rays in galactic black holes may be due to oscillation of the accretion shock waves. The post-shock region contains hot electrons which inverse Comptonize the soft photons and produce hard X-rays. Thus oscillation of shocks generate oscillating X-ray intensities. In this project subtle aspects of the oscillating signals to explore details of the accretion processes and the interaction

between the hydrodynamic flow and the radiation in studied. We also explore if the oscillation should be observed in extra-galactic and intermediate mass black holes.

2. *Emitted spectra from two component accretion disks around black hol*es, funded by Department of Science and Technology, April 2003 – September 2006.

   The aim has been to compute the solution of the equations governing the motion of hydrodynamic and hydro-magnetic flows around a black hole. These solutions are then used to obtain the nature of the emitted spectrum and its variability either through analytical means or through numerical simulations. Observed data from black hole candidates are also analyzed and quasi-periodic oscillations are studied. Models are presented to explain variations of the light curves for a given black hole candidate.

3. *Structure of Proto Stars and Outflows during collapse of inter-stellar clouds and their relation to complex organic molecule formation in space*, S. Chakrabarti (MMC College and Centre for Space Physics) and K. Acharyya (Centre for Space Physics), funded by Department of Science and Technology, April 2003 - March 2007.

   Proto-stars are formed out of collapsing diffused clouds. We produce a hydrodynamic code which follows the collapse of these clouds and produce proto-stars. The gas also contains dust grains (made up of olivine and amorphous carbon) on which simple atoms combine to produce molecules through hopping or tunneling processes. Monte-Carlo simulations to compute the molecule formation are carried out. We study the time dependent evolution of the chemical species in the gas and the grain phase and compare with the observed abundances of organic molecules in star forming regions.

4. *Study of polarization properties of radiation emitted from accretion disks around compact objects*, S. Burman and S. Mandal (Centre for Space Physics) funded by Indian Space Research Organization (April 2003 – September 2006).

   Inner edge of the accretion disk has a large ellipticity due to very fast rotation close to the black hole. These deformed regions produce radiations in which polarization is significant. Our first goal is to obtain the spectrum of the high energy gamma-rays from the inner part of this disk. The accretion shocks can accelerate electrons to a non-thermal distribution which in turn can produce a power-law soft X-ray spectrum were showed. These soft X-rays are then inverse Comptonized to a very high energy. The energies of the order of a few MeV could be achieved by repeated Compton scattering. The spectrum was then compared with that from the well known black hole candidates Cyg X-1.

5. *RT-2 experiment aboard Russian satellite CORONAS-PHOTON*, A. Nandi, D. Debnath and V. Yadav (Centre for Space Physics), A. Rao (TIFR) funded by Indian Space Research Organization (June 2005 – May 2007).

   The next solar maximum is expected to produce strong X-ray activities which could affect the ionospheric phenomena on earth.

Keeping this in view a payload is being designed and constructed to image the X-ray active regions on the solar disk. Imaging is done with CZT detectors. Photometry is also included. User-friendly softwares are being developed to ensure that the data, when comes from the satellite, are easily analyzed and interpreted. Testing and evaluation of the technology model is complete and it is being sent to Russia for integration with the rest of the payloads. The flight model will be sent in near future.

6. *ASTROSAT Satellite: The first Indian multi-wavelength instrument*, A. Nandi, S. Mandal and R. Sarkar (Centre for Space Physics), P.C. Agrawal and B. Paul (TIFR) funded by Indian Space Reseach Organization (April 2005 – March 2008)

   The first Indian multi-wavelength satellite will have X-ray imaging devices and spectrometers. It will also have UV and Gamma ray instruments. The part of the work that has been assigned is to generate shielding parameters (thickness, exact metals required) to cover the spectrometer and the imaging devices. These are obtained by using GEANT4 code (basically a Monte Carlo method) used in CERN to study interaction matter with high energy particles. Proper shielding would ensure that the backgrounds generated by interactions with cosmic rays and radiation belt particles are reduced. Appropriate estimates of these backgrounds are found.

Teaching programme

Introduction to Astronomy, astrophysics and space science, Post-B.Sc Integrated Ph. D at SNBNCBS, January 2005 - May 2005.

Supervision of students

i) Students doing Ph. D

1. Soumen Mondal, Jadavpur University
2. Kinsuk Acharyya, Calcutta University
3. Prasad Basu, Jadavpur University
4. Dipak Debnath, Calcutta University
5. Ankan Das, Calcutta University

ii) Ph. D. Thesis Submitted

1. Samir Mandal (Thesis on *Theoretical studies of spectral properties of two-component advective flows around black holes*), Jadavpur University, 2005.
2. Sabyasachi Pal (Thesis on *Radio Properties of Compact galactic Objects*), Jadavpur University, 2005.

iii) Students received degree of Ph. D

1. Anuj Nandi (Thesis on *Spectral and timing properties of accretion flows around black holes from observational data*), Jadavpur University, 2005.
2. Santabrata Das (Thesis on *Analytical studies of standing shocks in accretion flows around compact objects*), Jadavpur University, 2005.

Talks given

1. Invited talk on *Galaxies and Extra-Galactic Objects* at Jadavpur University, June 2005.
2. Invited talk on *Evolving view of Observable Universe* for the Year of Physics celebration at R.K.M. Vidyamandir, Belur, November 2005.
3. Invited talk on *Astrophysical Flows Around Black holes* in the Astrophysics

Workshop, St. Xavier's College, November 2005.

4. Invited talk on *Mysterious Universe* at the District wise Space Science Symposia in Dakshin Dinajpur and Darjeeling districts organized by Centre for Space Physics, February 2006.
5. Invited talk on *Can we Observe QPOs in using Tauvex?* at the Indo-Israeli Tauvex meet at Indian Institute of Astrophysics, Bangalore, March 2006.
6. Invited talk on *Analytical and Numerical Simulation of QPOs in black hole candidates* at the Physical Research Lab., Ahmedabad, March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Co-convenor of the *Districtwise Space Science Symposium* in Dakshin Dinajpur and Darjeeling Districts during 20-21 February 2006.
2. Attended and presented posters on SS433: Results of a recent multi-wavelength campaign and unusual sunset terminator behaviour of VLF signals at 17KHz during the earthquake episode of December 2004 at the General Assembly of *International Union of Radio and Space Physics* held in October, New Delhi.
3. Academic visit to TIFR (June 2005), ISRO HQ (August 2005, September 2005, December 2005, February 2006, March 2006), Vikram Sarabhai Space Centre (December, 2005) in relation to various collaborative programmes.

ii) Membership in committees / bodies

Member, Project Monitoring Board, RT-2 Payload for CORONAS-PHOTON Satellite, ISRO.

Dr. Biswajit Chakraborty

Publications

Journals

1. Frederik G. Scholtz, **Biswajit Chakraborty**, Sunandan Gangopadhyay, (2006), Dual Families of Non-commutative Quantum Systems, *Phys. Rev. D,* 71, 085005.
2. **Biswajit Chakraborty**, Sunandan Gangopadhyay, Arindam Ghosh Hazra, Frederik G. Scholtz (2005), Non (anti) commutativity for Open Superstrings, *Phys. Lett. B,* 625, 302-312.
3. Frederik G. Scholtz, **Biswajit Chakraborty**, Sunandan Gangopadhyay, Jan Govaerts, (2005), Interactions in Noncommutativity in Quantum Hall systems, *Jour. Phys. A,* 38, 9849- 9858.

Collaborative research & project work

Noncommutativity in String Theory, Gauge Theory and Condensed Matter Physics, Indo-South African Project, with Frederik G.Scholtz, University of Stellenbosch, South-Africa. Funded by Department of Science and Technology, Government of India and National Research Foundation, South-Africa for a period of 3 years.

Certain "shortcomings" of Seiberg-Witten map, in the sense that these maps are not spectrum preserving in presence of interactions has been

shown. The spectrum preserving map was constructed and then showed how the interactions can be traded with noncommutativity in the low energy sector. It was then showed, through the examples of some exactly solvable potentials, how the noncommutative parameter in the Landau problem gets renormalised in presence of potentials, away from the usual form, given in terms of the reciprocal of the magnetic field.This is then used to compute the filling fractions at incompressibility. Although the picture is very naïve, this computation surprisingly reproduces all the filling fractions of Fractional Quantum Hall Effect. It has been shown how the end points of a superstrings can reproduce non (anti) commutative structures at the end points.

Supervision of students

i) Students doing Ph. D

1. Sunandan Gangopadhyay, SNBNCBS
2. Arindam Ghosh Hazra, SNBNCBS

ii) Others

Supervised the summer porject work of Santidan Biswas, University of Pune and post M. Sc. project of Sourav Bhattacharya.

Talks given

Dual Families of Non-commutative Quantum Systems at

i) Institute of Mathematical Sciences, Chennai, 6 April 2005

ii) Centre for High Energy Physics, Indian Institute of Science, Bangalore, 15 April 2005

iii) Saha Institute of Nuclear Physics, 28 August 2005

iv) Department of Theoretical Physics, University of Witwatersrand, Johannesburg, South Africa, 7 September 2005

v) Department of Theoretical Physics, University of Stellenbosch, South Africa, 28 September 2005

vi) SNBNCBS, 6 January 2006

Other academic/educational activities

i) Visits, conferences, symposia

1. Organised *International Conference on Noncommutative Geometry and Quantum Physics* at SNBNCBS, 4-10 January 2006 (jointly with Dr. Rabin Banerjee).
2. *Academic visit*s to
   (i) Institute of Mathematical Sciences, Chennai, April 2005
   (ii) Centre for High Energy Physics, Indian Institute of Science, Bangalore April 2005
   (iii) University of Witwatersrand, Johannesburg, South Africa, September 2005
   (iv) University of Stellenbosch, South Africa, September-October 2005

ii) Membership in committees/bodies

Joint Convener of TPSC, SNBNCBS (since February 2006)

Ranjan Chaudhury

Collaborative research & project work

1. *Study of spin dynamics in the bi-layer magnetic systems below and above the ordering temperatures* in collaboration with Professor T. Chatterjee, ILL, Grenoble, France.

2. *Calculation of dynamical structure* factor and characterization of topological excitations for anisotropic quantum Heisenberg spin models on *low spatial dimensions,* in collaboration with Dr. S.K. Paul, SNBNCBS Kolkata.

3. *Segmentation of DNA sequences for various species,* in collaboration with Mr. S. Palit, Dr. A. Pan, Dr. J. Chakrabarti, all IACS Kolkata and Dr. S. Acharaya, WBUT Kolkata.

4. *Thermodynamics of DNA Sequences,* in collaboration with Dr. S. Acharaya, WBUT Kolkata.

5. *Random walk with waiting time and nucleotide distribution in DNA sequences* in collaboration with Mr. N. De, Dr. A Pan, Dr. J. Chakrabarti, all IACS Kolkata and Dr. S. Acharaya, WBUT Kolkata.

6. *Study of transport processes in molecular solids* in collaboration with Mr. A. Bag, Dr. S. Pal & both NCL Pune.

The detailed analysis of the results from Monte-Carlo-molecular dynamics alculations are being carried out for bi-layer ferromagnetic Heisenbergspin model. The propagating modes are found to occur above the ordering temperature as well. The theoretical results are being compared with those from the inelastic neutron scattering experiments on some of the ferromagnetic manganite systems.

The calculations are in progress to study behaviour of dynamical structure factor S (q,w) for quantum Heisenberg spin models on low dimensional lattices in various temperature regimes. The characterization of the topological excitations is also being looked into.

The segmentation of DNA sequences corresponding to various species are being studied by a combination of analytical and numerical techniques based on both information theoretic approach and chemical approach.

The thermodynamic and statistical analysis of DNA sequences is being carried out to test the validity of the concepts of the ensemble theory and random walk.

The role of electronic correlations is being investigated in the transport processes in the molecular solids.

Teaching programme

1. *An Introduction to Superconductivity Magnetism,* jointly with Dr K. Mandal, to the combined Post B.Sc. & Post M.Sc. students upto May 2005.

2. *Magnetism and Superconductivity* jointly with Dr. K. Mandal, to the combined Post B.Sc. & Post M.Sc. students since January 2006.

Supervision of Students

Supervised the summer project of Mr. Sudip Chakraborty, University of Pune,entitled *Modifications of Gorter-Casimir Two Fluid Model in Case of Cuprate Superconductors*, 23 May -12 July 2005.

Talks given

1. *Some Possible Studies on Electronic Properties of Correlated and Layered Systems,* invited talk in the Workshop on Application of High Magnetic Field in Condensed Matter Sciences, UGC-DAE Consortium for Scientific Research, Kolkata Centre, 6 September 2005.

2. *Electronic Models on Layered Systems Correlations and Fluctuations,* In-house Meeting (06), SNBNCBS, 24 March 2006.

Other academic/educational activities

i) Visits, conferences, Symposia

1. Chaired a session in the *Workshop* on *Application of High Magnetic Field in Condensed Matter Sciences,* UGC-DAE CSR, Kolkata, 6 September 2005.
2. Delivered 3 lectures entitled *Effective theories in Condensed Matter Physics* for the summer students from BHU, June 2005.

B. M. Deb

Vikram Sarabhai Research Professor, JNCASR, Bangalore

Collaborative Research

1. *High harmonics generation and electron density changes in the H_2 molecule under intense laser fields*, in collaboration with Dr.A.Wadehra, Department of Physics, Ohio State University, USA

   Under interaction with a high-intensity laser field, the real-time femtosecond dynamics of the electron density in the H_2 molecule has been studied quantum mechanically. For this purpose, a time-dependent generalized nonlinear Schrödinger equation of motion, developed by combining density functional theory and quantum fluid dynamics in real space, has been solved numerically.

2. *Study of quantum chaos in two-dimensional coupled nonlinear oscillators,* in collaboration with Dr. N. Gupta, Department of Chemistry, Panjab University, Chandigarh

   The detailed quantum dynamics of an electron moving in (i) a coupled quartic oscillator, (ii) a coupled double-well oscillator and (iii) a Henon-Heiles oscillator, under intense laser fields, have been investigated by numerically solving the corresponding time-dependent Schrödinger equations. Various dynamical signatures of quantum chaos, including a quantity analogous to quantum fidelity or Loschmidt echo, have been examined.

3. *Can an intense microwave laser dissociate a diatomic molecule ?,* in collaboration with Dr A. Wadehra, Department of Physics, Ohio State University, USA

   It has been concluded theoretically and computationally that it is possible to dissociate CO, a molecule of unusually high dissociation energy and modeled as a Morse oscillator, by using an intense microwave laser.

4. *A method of studying the electron density based dynamics of many-electron systems in scaled cylindrical coordinates,* in collaboration with Dr. A. Poddar, Surendranath Evening College, Kolkata.

An algorithm has been developed for numerically solving a time-dependent quantum fluid density functional equation of motion for noble gas atoms under strong perturbations in scaled cylindrical coordinates.

Teaching programme

1. CH 412 *Quantum Chemistry*, for post-B.Sc. Integrated Ph.D. and post-M.Sc. Ph.D. students in Chemical Sciences, Autumn Semester, 2005 along with Prof. S. P. Bhattacharya, IACS, Jadavpur.

2. CH 417 *Laboratory*, for post-B.Sc. Integrated Ph.D. students in Chemical Sciences, Autumn Semester, 2005 along with Dr. Ranjit Biswas, SNBNCBS.

3. CH 421 *Symmetry in Chemistry*, for post-B.Sc. Integrated Ph.D. and post-M.Sc. Ph.D.students in Chemical Sciences, Spring Semester, 2006.

4. Faculty advisor for students of post-B.Sc. Integrated Ph.D. Programme in Chemical Sciences.

Supervision of students

Post-doctoral students

Dr. Abhijit Poddar, Visiting Associate, SNBNCBS, Head, Electronics Section, Surendranath Evening College, Kolkata.

Talks given

1. *Can microwave radiation dissociate a diatomic molecule?*, National Symposium on Chemical Structures and Dynamics, IIT, Chennai, 22 April 2005.

2. *One-dimensional double-well oscillators as models for atoms/molecules under intense/ superintense laser fields,* Topical Conference on Atomic, Molecular and Optical Physics, IACS Jadavpur, 13-15 December 2005.

3. *The unreasonable efficacy of simple ideas : Direct calculation of electron density bypassing the wave function,* Recent Trends in Magnetism and Condensed Matter Physics(107th birth anniversary of Professor K. S. Krishnan), IACS, Jadavpur, 23 December 2005.

4. *Chemical education at the M.Sc. level : What do we want and how do we go about it ?,* Department of Chemistry, University of Calcutta, 8 February 2006.

5. *A time-dependent quantum fluid density functional theory of hydrogen molecule under intense laser fields,* Discussion Meeting on Materials & Molecular Modeling, IACS Jadavpur, 8-9 March 2006.

6. *A physical picture of the chemical bond*, Department of Chemistry, North Bengal University, 27 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Session Chairman, Annual Meeting, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore,14-15 November 2005.

2. Member, National Advisory Committee and Session Chairman, Topical Conference on Atomic, Molecular and Optical Physics, IACS, Jadavpur, 13- 15 December 2005.

3. Member, National Advisory Committee, National Symposium on Spectroscopy and its Applications, IACS Jadavpur, 18-20 January 2006.
4. Session Chairman, Meeting on Condensed Matter Physics, SNBNCBS, Kolkata, 10-11 March 2006.

ii) Membership in committees/bodies

1. U.G.C. Nominee, DSA Programme, Department of Chemistry, Gorakhpur University, Gorakhpur.
2. U.G.C. Nominee, Centre of Advanced Studies, Department of Chemistry, University of Delhi, New Delhi.
3. Member, Selection Committee for Professor in Physical Chemistry, IACS, Jadavpur.
4. Member, Curriculum Development Committee, Indian Institute of Science Education and Research, Kolkata and Pune.
5. Member, Editorial Advisory Board, Pure and Applied Chemistry, Journal of International Union of Pure and Applied Chemistry.

Sushanta Dattagupta

(on sabbatical leave from 3rd October 2005)

Publications

i) Journals

1. Jose Garcia-Palzazios* and **Sushanta Dattagupta** (2005), Spin Dynamics in a Dissipative Environment : from Quantal to Classical, *Physical Review Letters* 95, 190401.
2. Moloy Bandopadhyay and **Sushanta Dattagupta** (2006), Dissipative Landau Diamagnetism - A case study for Equilibrium and Nonequilibrium Statistical Mechanics, *Journal of Statistical Physics*, 128, 1273.
3. Moloy Bandopadhyay, **Sushanta Dattagupta** and Monamie Sanyal (2006), Diffusion enhancement in a periodic potential under high-frequency space-dependent forcing, *Physical Review E* 73, 051108.

ii) Proceedings

1. Statistical Physics, Proceedings of the *22nd IUPAP International Conference on Statistical Physics*, Indian Academy of Science, Bangalore (Editors : **S. Dattagupta**, H. R. Krishnamurthy, R. Pandit, T. V. Ramkrishnan and D. Sen), *Pramana - J. Physics*, Vol. 64, Nos. 5 & 6, May & June 2005.

iii) Others

1. *Einstein and Bose : A Few Lessons,* Annual Lecture of the Indian Physical Society, delivered at the Indian Association for the Cultivation of Science, 27 May 2005, published in Physics Teacher, April-June 2005.
2. *The Myth About Einstein*, 14th Kumari L. A. Meera Memorial Lecture, 17 November 2005, reprinted in the special Avogadro issue of Resonance, Indian Academy of Sciences, January 2006.

* Visitor (from Spain) to the S. N. Bose National Centre

Teaching Programme

1. *Quantum Mechanics III*, shared (with B. Dutta Roy) course on PBIR programme in Physical Sciences, April-June 2005.

2. *Topics in Condensed Matter Physics* shared (with A. Mookherjee) course on, PBIR programme in Physical Sciences, August - September 2005.

Supervision of Students

i) Ph. D. Students

Supervision of Ph.D. Thesis of Suvankar Chakraborty, Moloy Bandopadhyay, Mrinal Bera (jointly with Milan K. Sanyal) and Abhishek Pandey (jointly with R. Ranganathan)

ii) Others

Summer Project of Monamie Sanyal, I. I. T. Kanpur.

Talks Given

1. *Memory in Magnetic Nanoparticles*, School of Physical Science, Jawaharlal Nehru University, New Delhi, 1 April 2005.

2. *Einstein's Work on Brownian Motion and Photon*, Nuclear Science Center, New Delhi, 25 April 2005.

3. *The Myth About Einstein*, The National Brain Research Center, Manesar, Haryana, 26 April 2005.

4. *Einstein and Bose - A Few Lessons*, Dhaka University, Bangladesh, 1 May 2005.

5. *How to Enthuse Students?*, JBNSTS seminar held at the National Institute of Technical Teacher's Training & Research, Kolkata, 18 May 2005.

6. Four lectures on *Nanomagnetism*, at a Summer School in Nao Systems, Institute Jozeph Stefan, Ljublijana, Slovania, 13-24 June 2005.

7. *Brownian Motion*, Einstein Symposium of The Calcutta Mathematical Society and Indian Statistical Institute, 25 June 2005.

8. Valedictory Lecture on *The Myth About Einstein,* a Summer Training School in the Indira Gandhi Center for Atomic Research, 6 July 2005.

9. *Diffusion in a Peridoic Potential under High-Frequency Perturbation*, School of Physical Sciences, Jawaharlal Nehru University, 22 July 2005.

10. *Dissipative Diamagnetism*, Physics Department, Indian Institute of Science, Bangalore, 16 August 2005.

11. *Capacity Building - a Kolkata Experience*, Sivatosh Mookherjee Memorial Institute, Kolkata, 27 August 2005.

12. *Diffusion in a Periodic Potential under High-Frequency Perturbation*, a symposium on Nonlinear Phenomena, Materials Research Center, Indian Institute of Science, Bangalore, 29 August 2005.

13. *Einstein's Work on Brownian Motion*, National Chemical Laboratory, Pune, 30 August 2005.

14. *Relaxation in Nanomagnetic Particles,* Platinum Jubilee and M. N. Saha's Birthday Symposium at the National Academy of Sciences, Allahabad, 6 October 2005.

15. *Careers in Basic Sciences,* a seminar at the National Institute for Advanced Studies, Bangalore, 26 October 2005.

16. *The Myth About Einstein*, Einstein Symposium at the Indian Institute of Technology, Kanpur, 4-6 November 2005.

17. *Relaxation in Nanomagnetic Particles*, Department of Physics, Banaras Hindu University, 25 November 2005.

18. *The Myth About Einstein*, Einstein Symposium at the Physical Research Laboratory, Ahmedabad, 16 December 2005.

19. *Science Capacity Building - a Kolkata Experience*, Ahmedabad Management Association, 17 December 2005.

20. *Einstein's Work on Brownian Motion and Photon*, School of Physics, Central University of Hyderabad, 19 December 2005.

21. *Relaxation in Nanomagnetic Particles*, School of Physics, University of Hyderabad, 20 December 2005.

22. *Memory in Magnetic Nanoparticles*, Indo-Belarus Meeting on Nanoscience, Powder Metallurgy Center, Kanchanbagh, Hyderabad, 21-23 December 2005.

23. Three lectures on *Relaxation in Magnetic Nanoparticles*, Meera Memorial School at Varadanhali, Bangalore, 4-7 January 2006.

24. Six lectures on *Memory in Nanomagnetic Particles*, SERC School on Condensed Matter Physics, Kolkata, 16-18 January 2006.

25. *The Myth About Einstein,* National Institute of Information Technology, Durgapur, 19 January 2006.

26. *Anderson - Hasegawa Model Revisited and Raman Scattering in Manganites,* Indo-Japan Seminar on GMR in Oxide Materials, Solid State & Structural Chemistry Unit, Indian Institute of Science, Bangalore, 30-31 January 2006.

27. Three lectures on *Nanomagnets,* Summer School on Soft-Condensed Matter Physics, University of Sao Paulo, Brazil, 13-28 February 2006.

28. *From Quantal to Classical,* a Symposium on Advances in Condensed Matter Physics, School of Physics Science, Jawaharlal, Neheru University, New Delhi, 3-4 March 2006.

29. *Dissipative Landau Diamagnetism*, Department of Physics, Tel Aviv University, Israel, 20 March 2006.

30. *Memory in Magnetic Nanoparticles*, Ben Gurion University, Beer Sheva, Israel, 27 March 2006.

Other academic/educational activities

Membership of Committees/bodies

1. Indian Coordinator for the 3rd Indo-Israeli meeting on Condensed Matter Physics, Toshali Sands, Orissa, 16-23 April 2005.

2. Convener of the National Coordinator Committee for Indian Institute of Science Education & Research, Ministry of the Human Resource Development, Government of India.

3. Programme Coordinator for a 3-Member Committee for initiating two Indian

Institutes of Science Education & Research in Pune and Kolkata, appointed by the Ministry of the Human Resource & Development, Government of India.

4. Chairman of the Fellowship Election Committee (Physics) of the Academy of Sciences for the Developing World (TWAS), Trieste, Italy.

5. Area Coordinator (Mathematics & Physical Science), Indo-Brazil Cooperation in Science & Technology.

6. Vice President and Member of the Council, Indian Academy of Sciences, Bangalore.

7. Member of the Council and the Scrutiny Committee (Physical Sciences), National Academy of Sciences, Allahabad.

8. Chairman of the IUPAP National Committee of the Indian National Science Academy, New Delhi.

9. Member, Shyama Prasad Mookherjee Fellowship Committee of C. S. I. R. Delhi.

10. Member, Academy Committee, Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore.

11. Member, Research Council, National Physical Laboratory, New Delhi.

12. Member, Academic Council of Viswa Bharati, Santiniketan.

13. Member, Executive Council, Burdwan University, Burdwan.

14. Member, Executive Body, Science City, Kolkata.

15. Convener of the Local Implementation Committee of the Indian Institute of Science Education & Research, Kolkata, appointed by the Ministry of Human Resource & Development, Government of India.

Others

Referee for

(a) Physical Review Letters

(b) Physical Review A

(c) Physical Review B

(d) Physical Review E

(e) Pramana - J. Physics.

Awards/Honours received

1. Swamy Atulnanda Endowment Award Lecture, on *The Myth About Einstein*, Ramkrishna Mission, Kolkata, 14 May 2005.

2. 14th Kumari L. A. Meera Memorial Lecture, on *The Myth About Einstein*, Bangalore, 17 November 2005.

3. Meghnad Saha Memorial Award Lecture of the National Academy of Science (Allahabad) on *The Paradigm Called Magnetism*, delivered at the Annual Session of the National Academy, Pondichery Central University, 9 December 2005.

4. C. V. Raman Birth Centenary Award, Gold Medal awarded by the Prime Minister Dr. Manmohan Singh during the 93rd Indian

Science Congress, held at Hyderabad during 3-7 January, 2006.

5. Honorary Professor, Jawaharlal Nehru Centre for Advance Scientific Research, Bangalore.

6. Honorary Professor, Indian Association for the Cultivation of Science, Kolkata.

Debashis Gangopadhyay

Publications

i) Journals

Debashis Gangopadhyay, M.N.Sinha Roy (2006), Quantum logic gates using q-deformed oscillators, *International Journal of Quantum Information,* 4,1.

Teaching Programme

Classical Dynamics, Post-B.Sc. Integrated Ph.D., 1st Semester 2005.

Talks given

*Where is the missing matter in the universe,*CSIR Programme on Youth for Leadership in Science 2006, Central Mechanical Engineering Research Institute(CMERI), Durgapur, 17 January 2006.

Gautam Gangopadhyay

Publications

i) Journals

1. S. Banerjee and **G. Gangopadhyay** (2005), Laser cooling of vibrational degrees of freedom of a molecular system, *J. Chem. Phys.,* 123, 114304.

2. D. Rana and **G Gangopadhyay** (2006), Theoretical studies of electron transfer through dendrimeric architecture, *J Chem Phys*, 124, 044909.

Teaching Programme

1. *Mathematical Methods* (24 lectures), Post-BSc (Chemical Sciences) in the first semester August-December 2005.

2. *Quantum theory of atomic processes and vector atom model* (24 lectures), M.Sc. (Chemistry) program at Scottish Church College, Kolkata, February-May 2006.

Talks given

On Laser cooling of vibrational degrees of freedom of molecular system, Delhi University in 2nd International Conference on Current Developments in Atomic Molecular and Optical Process, 21-23 March 2006.

Supervision of students

Students doing Ph.D.

1. S. Banerjee, external student, SNBNCBS

2. D. Rana, external student

Partha Guha

Publications

Journals

1. **Partha Guha** (2005), Geodesic Flows, Bihamiltonian structure and coupled KdV type systems, *Journal of Mathematical Analysis and Applications*, 310 no. 1, 45—56.

2. **Partha Guha** (2005), Euler-Poincare Formalism of Coupled KdV type systems and Diffeomorphism group on S^1, *Journal of Applied Analysis* 11, 261-282.

3. **Partha Guha** (2005), Space of Higher Order Differential Operators on S^1 and Integrable Flows, *International Journal of Geometric Methods in Modern Physics* 2, 619-631.

4. **Partha Guha** (2006), Euler-Poincare Flows and Leibniz Structure of Nonlinear Reaction-Diffusion and type Systems, *Journal of Geometry and Physics* 56,no.9, 1736-1751.

5. **Partha Guha** and Peter J. Olver (2006), Geodesic Flow and Two (Super) Component Analog of the Camassa—Holm Equation, *Symmetry, Integrability and Geometry: Methods and Applications (SIGMA)*, vol. 2, no. 54, pp 9.

6. **Partha Guha** (2006), Bidifferential Calculi, Bicomplex structure and its Application to Bihamiltonian systems, *International Journal of Geometric Methods in Modern Physics* 3, 209-232.

Supervision of students

Students doing Ph. D

Sagar Chakraborty

Talks given

1. *Euler- Poincare Formalism for Dissipative Dynamics*,Department of Mathematics, International University- Bremen, Germany, 21 November 2005.

2. *Motion of Curves, Integrable Structures and Applications to Biopolymers*, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany, 9 November 2005.

3. *Metriplectic Structures, Leibniz Dynamics and Disspative Systems*, Institute of Mathematics, TU Clausthal, Germany, 4 November 2005.

4. *Geometry of infinite-dimensional group and integrable systems,* Harish-Chandra Research Institute, Allahabad, 13 and 14 October 2005 (two talks).

5. *Euler-Poincare flows on the extension of the Bott-Virasoro group and multicomponent KdV equations,* Department of Mathematics, TU Munich, Germany, 4 July 2005.

6. *Hamiltonian Approach to Integrable Systems,*Institute of Theoretical Physics, TU Clausthal, Germany, 9 June 2005.

Amitabha Lahiri

Publications

i) Journals

Amitabha Lahiri (2005), Parallel Transport on Non-Abelian Flux Tubes, *Modern Physics Letters*, A20, 1695.

ii) Reviews

1. **Amitabha Lahiri**, (2005), Higher gauge theory—differential versus integral formulation (by Florian Girelli and Hendryk Pfeiffer), *Mathematical Reviews,* MR2095681.
2. **Amitabha Lahiri** (2005), State-sum models, gerbes and holonomy (by M. Mackaay and R. Picken), *Mathematical Reviews,* MR2123510.

3. **Amitabha Lahiri** (2006), Combinatorics of non- abelian gerbes with connection and curvature (by Romain Attal), *Mathematical Reviews,* MR2146290.

iii) Proceedings

Amitabha Lahiri (2005), Understanding Space and Time in the General Theory of Relativity, *Legacy of Einstein*, 218.

Teaching programme

1. *Introduction to String Theory*, Summer project/ reading course to Mr. S. Kulkarni, Post- M.Sc Integrated Ph.D student, SNBNCBS, Summer 2005.

2. *Quantum field theory: An introduction*, Post M.Sc Integrated Ph. D, SNBNCBS, Autumn Semester, 2005 (shared with R. Banerjee).

3. *Quantum field theory: A modern perspective*, Post-M.Sc Integrated Ph. D at SNBNCBS, Spring Semester, 2006 (also as PHY 406 for Post-B.Sc Integrated Ph. D).

Supervision of students

Students doing Ph.D

1. Chandrasekhar Chatterjee,WBUT (PBIR programme)

2. Saikat Chatterjee,WBUT (PBIR programme)

Talks given

Understanding Space and Time in the General Theory of Relativity, Department of Physics, Jadavpur University, 10 December 2005.

Other academic/educational activities

i) Visits, conferences, symposia

Gave a talk at the *World Year of Physics 2005: Legacy of Einstein*' conference organised by School of Fundamental Research, 10 December 2005.

ii) Membership in committees/bodies

1. Member, Students' Curriculum and Research Evaluation Committee, SNBNCBS.

2. Member, Computer Users Committee SNBNCBS.

Priya Mahadevan

Publications

i) Journals

1. Y.J. Zhao, **Priya Mahadevan** and Alex Zunger (2005), Practical rules for orbital-controlled ferromagnetism of 3d impurities in semiconductors, *Journal of Applied Physics,* 98, 113901.

2. S. Raj, D. Hashimoto, H. Matsui, S. Souma, T. Takahashi, S. Ray, A. Chakraborty, D.D. Sarma, **Priya Mahadevan**, W.H. McCarroll and M. Greenblatt (2005), Angle-resolved photoemission spectroscopy of the metallic sodium tungsten bronzes Na_xWO_3, *Phys. Rev B,* 72, 125125.

3. **Priya Mahadevan** and S. Mahalakshmi (2006), Suitability of p-type conditions for ferromagnetism in GaN:Mn, *Phys. Rev. B,* 73, 153201.

4. S. Raj, D. Hashimoto, H. Matsui, S. Souma, T. Sato, T. Takahashi, D. D. Sarma, **Priya Mahadevan**, S. Oishi (2006), Angle resolved photoemission spectroscopy of the insulating Na_xWO_3: Anderson localization, polaron formation and remnant fermi surface, *Phys. Rev. Lett.*, 96 147603.
5. K. Maiti, U. Manju, S. Ray, **Priya Mahadevan**, I.H. Inoue, C.Carbone and D.D. Sarma (2006),Understanding the bulk electronic structure of $CaSr_xVO_3$, *Phys. Rev B*, 73 052508.

Collaborative research & project work

Electronic structure of dilute magnetic semiconductors, Principal Collaborator: Kalobaran Maiti, funded by DAE-BRNS, 2005-2008.

Teaching programme

Statistical Mechanics, Post-MSc, SNBNCBS, Autumn Semester, 2005.

Talks given

1. *In search of a model for dilute magnetic semiconductors*, First Principle Simulation Group, NIMS, Tsukuba, 22 February 2006.
2. *In search of a model for dilute magnetic semiconductors*, Graduate School of Frontier Science, Tokyo University, Tokyo, 15 March 2006.
3. Invited talk at Indo-Japan joint seminar on GMR materials and their electronic structure, IISc, Bangalore, 30 January 2006.
4. Talk at Spintronics workshop, Institute of Advanced Study, NTU, Singapore, 12 May 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Academic visit to TIFR, Mumbai, December 2005.
2. Academic visit to NIMS, Tsukuba, Feburay -March 2005.

Alak Majumdar

Publications

i) Journals

1. P. Khatua, T. K. Nath, and **A.K. Majumdar** (2006), Extraordinary Hall effect in self-assembled epitaxial Ni Crystallites embedded in a TiN matrix, *Phys. Rev. B* 73, 064408.
2. D. K. Avasthi, S. K. Srivastava, R. Kumar, A. Gupta, R. S. Patel, and **A. K. Majumdar** (2006), Swift heavy ion induced mixing in Fe/Ni multilayer, *Nuclear Instruments & Methods in Physics B*, 243, 304.
3. P. Khatua, **A. K. Majumdar**, D. Temple, and C. Pace (2006), Scaling law and its universality in the anomalous Hall effect of giant magnetoresistive Fe/Cr multilayers, *Phys. Rev. B* 73, 094421.

Talks given

Recent trends in magnetic materials research, the 17th S. D. Chatterjee Endowment Lecture organized by The Indian Physical Society at SNBNCBS on 22 March 2006.

Archan S. Majumdar

Publications

i) Journals

1. **A. S. Majumdar**, Nupur Mukherjee (2005), Braneworld black holes in cosmology and astrophysics, *Int. J. Mod. Phys. D,* 14, 1095 (*Invited Review Article*).
2. **A. S. Majumdar**, Nupur Mukherjee (2005), Gravitational lensing in the weak field limit by a braneworld black hole, *Mod. Phys. Lett. A*, 20, 2487.
3. Md. Manirul Ali, **A. S. Majumdar**, D. Home (2006), Quantum superarrivals: Bohr's wave-particle duality revisited, *Found. Phys. Lett.*, 19, 179.

ii) Proceedings

A. Mehta, **A. S. Majumdar**, J. M. Luck (2005), How the rich get richer, In *Econophysics of wealth distributions,* eds. A. Chatterjee, B. K.Chakrabarti and S. Yarlagadda, Springer-Verlag Italia, 2006, 199.

iii) Books

1. **A. S. Majumdar** (2006), Cosmology with primordial black holes, in *Focus on black hole research*, ed. P. V. Kreitler (Nova Science Publishers, 2006), 159.

Collaborative Research & Project work

1. *Quantum entanglement and information transfer in atom-photon interactions,* Collaborator: N. Nayak, SNBNCBS.
2. *Dynamics of quantum wave packets and the classical limit,* Collaborator: D. Home, Bose Institute.

Teaching programme

Course on *Recent developments in Cosmology,* at the A.K. Raychaudhury School on General Relativity, held at Saha Institute of Nuclear Physics, 2005.

Supervision of students

i) Students doing Ph.D

1. Md. Manirul Ali,thesis on *Arrival times of quantum wave packets,* submitted to Jadavpur University, 2005.
2. Biplab Ghosh
3. Nupur Mukherjee

ii) Others

Supervised summer project of Suklima Guha-Niyogi of Pune University.

Talks given

1. *Quantum information transfer in atom-photon interactions,* Indian Association for the Cultivation of Science, Kolkata, November 2005.
2. *Braneworld black holes in cosmology and astrophysics,* International Conference on Einstein's Legacy in the New Millenium, Hotel Toshali Sands, Puri 2005.

Other academic/educational activities

1. Organised the *A.K. Raychaudhury School on General Relativity,* as member of Academic Committee, at Saha Institute of Nuclear Physics, 2005.

2. Officiated as judge to award best presentations in the *Young Physicists Colloquium organised by the Indian Physical Society, S*aha Institute of Nuclear Physics, 2005.

3. Invited speaker at *Topical Conference on Atomic, Molecular and Optical Physics,* held at Indian Association for the Cultivation of Science, November 2005.

4. Invited speaker at *International Conference on Einstein's Legacy in the New Millenium,* organised by Institute of Physics, Bubaneswar, held at Hotel Toshali Sands, Puri, November 2005.

5. Co-organised SNBOSEFEST'06 (Annual In-House Meeting)

Kalyan Mandal

Publications

i) Journals

1. S. Sinha and **K. Mandal** (2005), Effect of tensile stress on the magnetic Barkhausen noise in amorphous $Fe_{70}Ni_8Si_{10}B_{12}$ ribbon, *Indian J. Phys.*, 79 (9), 991-993.

2. **K. Mandal**, S. Sinha and P. Anil Kumar (2006), Contributions to giant magnetoimpedance from different domain regions of $Co_{68.15}Fe_{4.35}Si_{12.5}B_{15}$ amorphous wire, *J. Appl. Phys*., 99, 033901(1-5).

3. S. Sinha**, K. Mandal** and M. Vazquez (2006), Giant magnetoimpedance in amorphous $(Co_{0.93}Fe_{0.07})_{63}Ni_{10}Si_{11}B_{16}$ glass-coated microwire, *J. Magn. Magn. Mater*., 302**,** 223-227.

i) Proceedings

1. S. Mitra, **K. Mandal** (2006), Superparamagnetic behavior in non-interacting $NiFe_2O_4$ nanoparticles grown in SiO_2 matrix, *International Conference on Advances in Materials and Materials Processings*, 432.

2. S. Sinha, **K. Mandal** (2006), Study of Magnetic Barkhausen noise from amorphous $Fe_{70}Ni_8Si_{10}B_{12}$ and $Fe_{40}Ni_{40}B_{20}$ ribbons*, National Seminar on NDT & E (NDE-2005)*, 76.

3. S. Sinha, **K. Mandal** (2005), Magnetic Barkhausen noise study from amorphous ribbons, *SNBOSEFEST '06 (Annual In-House Meeting)*, 12.

4. P. Anil Kumar, S. Mitra, **K. Mandal** (2006), Structural and magnetic properties of Co nanoparticles in Cu/SiO_2 matrix. *National Conference on Condensed Matter and Material Physics*, 44.

5. S. Sinha, **K. Mandal** (2005), Study of Giant Magnetoimpedance of $Co_{68.15}Fe_{4.35}Si_{12.5}B_{15}$ amorphous wire, *Condensed Matter Days 2005*, 46.

Collaborative research & project work

i) Project Work

1. *Synthesis and characterization of ferrite nanoparticles,* funded by Department of Science and Technology, June 2002-June 2006.

Various ferrite nanoparticles (2.5nm to 25nm) have been prepared by sol-gel method. A vibrating sample magnetometer and a susceptibility measurement set-up have been developed under this project. Structural and magnetic properties of ferrite nanoparticles have been studied in details.

2. *Characterization of magnetic materials by nondestructive Barkhausen noise measurement*, funded by Board of Research in Nuclear Science, August 2003 – August 2006.

   A sensitive magnetic Barkhausen noise (MBN) measurement set-up has been developed. MBN from various magnetic materials have been studied in details.

ii) Collaborative research

1. *M. Vázquez, Instituto de Ciencia de Materials de Madrid, Spain:* Study of magnetic properties of various amorphous magnetic materials is going on.
2. *O. Gutfleisch, IFW-Dresden, Germany:* Investigation of magnetocaloric effect and ferromagnetic shape memory alloy is going on.
3. *A. Mehta, SNBNCBS, Kolkata:* Planning to investigate Barkhausen noise with symbiosis between theory and experiment. The avalanche spectrum has so far been looked at with a view to analogies with SOC, with spatially averaged measurements. Local measurements in our view would yield far more information about spatiotemporal inhomogeneities, thus leading to the possibility that the statistics of the system are in reality not describable by SOC (as is the case with many realistic systems). This will be probed further.
4. *P.M.G. Nambissan, SINP, Kolkata:* In collaboration with Professor Nambissan, positron annihilation study of various magnetic nanomaterials has been performed.

Teaching programme

1. *Magnetism and Superconductivity,* for Post B.Sc. Integrated Ph.D. and Post M. Sc. Integrated Ph.D.course at SNBNCBS, Spring Semester, 2005.
2. *Basic Laboratory: Solid State, Nuclear and Atomic Physics*, for Post B.Sc.-Integrated Ph.D. Autumn Semester, 2005.

Supervision of students

i) Students for degree of Ph. D.

1. Subarna Mitra
2. Suman Sinha
3. P. Anil Kumar
4. Bipul Das

ii) Others

Students for project of Post M.Sc.-Integrated Ph.D. program : P. Anil Kumar

Students for project of Post B.Sc.-Integrated Ph.D. program : Bipul Das

Talks given

1. *Magnetocaloric effect*, at Inter-University Consortium, Kolkata,6 September 2005.
2. *Giant magnetoimpedance in amorphous magnetic materials*, at SNBOSEFEST '06

(Annual In-House Meeting), S. N. Bose National Centre For Basic Sciences, Kolkata, 24 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Organised *Workshop on the Applications of High Magnetic Field in Condensed Matter Science*, at UGC-DAE, CSR, Kolkata, 6 September 2005.
2. Attended *SNBOSEFEST '06* (Annual In House Meeting) at S. N. Bose National Centre For Basic Sciences, Kolkata, 23-24 March 2006.

ii) Membership in committees/bodies

1. Elected as Member, Executive Committee, *Indian Society for Non-*Destructive Testing, Kolkata Chapter.
2. Member, *Teaching Committee, SNBNCBS.*
3. Member, *Admission Committee,* SNBNCBS.
4. Member, *Department Restructuring Committee, SNBNCBS.*

Awards/Honours received

Received H*umboldt Research Fellowship* from Alexander von Humboldt Stiftung, Germany to work in IFW-Dresden for three months.

Subhrangshu Sekhar Manna

Publications

i) Journals

G. Mukherjee and **S. S. Manna** (2005), Phase transition in a directed traffic flow network, *Phys. Rev. E.* 71, 066108.

i) Proceedings

1. K. Bhattacharya, G. Mukherjee and **S. S. Manna** (2005), Detailed Simulation Results for Some Wealth Distribution Models in Econophysics in the *Proceedings of Econophysics of Wealth Distributions,* Ed. by A. Chatterjee, S. Yarlagadda and B. K. Chakrabarti, Springer Publications.
2. G. Mukherjee and **S. S. Manna** (2005), Traffic flow on directed square lattice, Physica A, 346, 132, *Proceedings of* STATPHYS – KOLKATA V on Complex *Networks: Structure, Function and Processes*, Ed. by S. S. Manna and P. Sen.

Teaching programme

(i) Self-Organized criticality-I (ii) Self-Organized Criticality-II (iii) Bootstrap percolation and Diagenesis (iv) Complex Networks (v) *Models of Wealth distributions* : A series of five lectures delivered in the Laboratory of Computational Engineering, Helsinki University of Technology, Finland during November, 2005.

Talks given

Self-organized critical models of Earthquakes, Conference on Models of Earthquakes: Physics Approaches, Saha Institute of Nuclear Physics, Kolkata, 13 - 16 December 2005.

Supervision of students

Students received Ph. D

Rumani Karmakar (Thesis on *Study of scale- free correlated clusters in the non-equilibrium and equilibrium critical phenomena*), Jadavpur University, 2006.

Other academic/educational activities

Visits, conferences, symposia

Invited participation in *ECONOPHYS - KOLKATA II: International Workshop on Econophysics of Stock Markets and Minority Games,* Saha Institute of Nuclear Physics, Kolkata, 14-17 February 2006.

Manu Mathur

Publications

i) Journals

1. **Manu Mathur** and Samir Kumar Paul (2005), Coherent States with SU(2) and SU(3) Charges, *J. Phys. A* 38, 7863.
2. **Manu Mathur** (2005), Harmonic Oscillator Prepotentials in SU(2) Lattice Gauge Theory, *J. Phys. A* 38, 10015.

ii) Proceedings

Manu Mathur (2006), Loop States in Lattice Gauge Theory, *Sense of Beauty in Physics, A Fest. for Adriano di Giacomo,* Pisa, 26-27 January 2006.

Collaborative research & project work

On The Loop States in Loop Quantum Gravity, N. D. Hari Dass, IMSc Chennai.

In this work, the Ashtekar formulation of gravity by regulating it on a regular 3-d lattice is studied. The Schwinger bosons representation of SU(2) Lie algebra to explicitly construct all possible orthonormal gauge invariant (loop) states and classify them by their angular momentum quantum numbers is used. This loop basis enables to study the spectrum of the volume operator in the gauge invariant Hilbert space. Some simple eigenvectors of the volume operator and the corresponding eigenvalues are explicitly computed.

Summary of Research work done during last year

1. *The Prepotential Formulation of Lattice Gauge Theories*: The SU(2) lattice gauge theory Hamiltonian in d dimension in terms of prepotentials which are SU(2) fundamental doublets of harmonic oscillators is written. The Hamiltonian in terms of prepotentials has $SU(2) \times U(1)$ gauge invariance. This prepotential formulation enables to solve the Gauss law and characterize the corresponding loop states in terms of d(2d-1) gauge invariant integers per lattice site. The extension to SU(N) is discussed.

2. *Solutions of the Mandelstam Constraints in Lattice Gauge Theory:* In this work we solve the Gauss law as well as the corresponding Mandelstam constraints of $(d+1)$ dimensional SU(2) lattice gauge theories in terms of loop states built out of the prepotential operators is solved. This loop basis is characterized by 3(d-1) gauge invariant(dual) angular momentum quantum numbers at every lattice site which is the number of physical degrees of freedom of the gluons. The loop Hamiltonian is derived. The extension to SU(N) gauge group is also discussed.

3. *Coherent States with SU(2) and SU(3) Charges*: New types of coherent states which carry SU(2) (SU(3)) charges is constructed.

Teaching programme

Classical Electrodynamics II, Post-BSc, Integrated Ph.D at SNBNCBS, Spring Semester, 2005.

Talks given

1. *The Loop States in Lattice Gauge Theories*, Institute of Mathematical Sciences, Chennai, 9 January 2006.

2. *The Loop States in Lattice Gauge Theories*, Tata Institute of Fundamenta Research, Mumbai, 27 October 2005.

3. *The Mandelstam Constraints in Lattice Gauge Theories*, Dipartimento di Fisica, Pisa University, Pisa, Italy, 5 February 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Academic visit to Tata Institute of Fundamental Research, Mumbai from 15 October - 15 November 2005.
2. Academic visit to The Institute of Mathematical Sciences, Chennai from 8 - 12 January 2005.
3. Academic visit to Dipartimento di Fisica, Pisa University, Pisa, Italy, from 26 January - 11 February 2006.

Anita Mehta

Publications

i) Journals

1. **Anita Mehta**, J M Luck, J. M. Berg, and G C Barker (2005), Competition and cooperation: aspects of dynamics in sandpiles, *J. Phys. Cond. Mat,* 17, S2657.
2. A. S. Majumdar, **Anita Mehta** and J. M. Luck (2005), Interacting black holes on the brane: the seeding of binaries, *Physics Letters B*, 607, 219.
3. J.M. Luck and **Anita Mehta** (2005), A deterministic model of competitive cluster growth : glassy dynamics, metastability and pattern formation, *European Physics Journal B,* 44, 79.

Collaborative research & project work

Investigation of characteristic spatiotemporal scales in magnetic domains via Barkhausen noise measurements, with Dr. K. Mandal of SNBNCBS, funded by DST.

While most measurements of Barkhausen noise to date have indicated that magnetic domains are scalefree, it is wished, given the rarity of true scale-invariance in realistic systems, to undertake more local measurements to see if this is indeed the case. This project entails joint experimental and theoretical work, marrying ideas of complex systems with experiments undertaken on the nanoscale.

Talks given

1. *Probing sand* at Department of Physics, University of San Diego, La Jolla, USA, May 2005.

2. *A columnar model of grains near jamming* at Service de Physique Theorique, CEA Saclay, Paris, France, May 2005.

3. *The dynamics of sand* at Institut Laue Langevin, Grenoble, France, June 2005.

4. *The glassy dynamics of vibrated sand* at Laboratoire Physique Theorique de La

Matiere Condensee, Jussieu, Paris, France, September 2005.

Other academic/educational activities

i) Visits, conferences, symposia

1. Invited longstay participant to session on *Granular Physics* at the Kavli Institute for Theoretical Physics, Santa Barbara, California, May 2005.
2. Invited speaker at *Seventh International Conference on Vibration Problems - ICOVP 2005* in Istanbul, Turkey, September 2005.
3. Invited lecturer on *Women and the politics of representation: the case of science* at University Grants Commission-sponsored lecture course, Jadavpur University, Calcutta, September 2005.
4. Invited lecturer at *Still Centres, Moving Boundaries: Literature as Knowledge system*, Centre for Advanced Studies, Department of Comparative Literature, Jadavpur University, December 2005.
5. Invited lecturer at *Models of Earthquakes: Physics Approaches*, Saha Institute of Nuclear Physics, Calcutta, December 2005.
6. Invited as Executive Committee Member to the *Forum of International Physics* Sessions, March meeting of the *American Physical Society*, Baltimore, Maryland, USA.
7. Invited to the F*orum of International Physics Executive Committee Meeting*, April meeting of the *American Physical Society*, Dallas, Texas, USA.
8. Visiting Scientist at Service de Physique Theorique, CEA Saclay, France, September 2005.
9. Visiting Scientist at Service de Physique Theorique, CEA Saclay, France, June 2005.

ii) Membership in committees/bodies

1. Member of *Scientific Organising Committee for Powders and Grains '05*, Stuttgart, Germany, 2005.
2. Member of *Scientific Committee of Association pour l'Etude de la Micromecanique des Milieux Granulaires* since 1989.
3. Member of the Editorial Board of the *Journal of Statistical Mechanics: Theory and Experiment,* SISSA, Trieste, Italy, since 2004.
4. Member of Board of Editors for *Granular Matter*, (Springer-Verlag, Heidelberg, since 1997.
5. Member, *American Physical Society*, (2006).

Awards/Honours received

1. *2006-07 Radcliffe Fellowship* to Harvard University, USA, announced March 2006.
2. Award from the *Indo-US Forum for Science and Technology* to attend the March meeting of the American Physical Society, Baltimore, Maryland, USA, March 2006.
3. Elected Member-at-Large of Executive Council, *Forum of International Physics, American Physical Society* w.e.f. March 2006.

4. Profiled in *News from ICTP*, Abdus Salam International Centre for Theoretical Physics, Spring 2005: no. 112.

Abhijit Mookerjee

Publications

i) Journals

1. G. Pari, **A. Mookerjee** and A.K Bhattacharya (2005), Investigation of the role of 3d-transition metal atoms (M = Ti-Ni) in a $Y_3A_{l5}O_{12}$ matrix by first principles electronics tructure calculations., *Physica B : Condens Matter* 358, 7.
2. Atisdipankar Chakrabarti and **A. Mookerjee** (2005), A self-consistent TB-LMTO-ASR method for the study of electronic structure of disordered binary alloys., *E. Physical J B,* 44, 21.
3. Kamal K. Saha and **A. Mookerjee** (2005), Optical properties of random alloys: application to CuAu and NiPt, *J. Phys. Condens Matter* 17, 4559-66.
4. G. Pari, **A. Mookerjee** and A.K Bhattacharya (2005), Investigation of the role of rare-earth atoms in a $Y_3Al_5O_{12}$ matrix by first principles electronic structure calculations., *Physica B: Condensed Matter,* 365,163.
5. D. Paudyal and **A. Mookerjee** (2005), Phase stability in 3d-4d (CuAu) and segregation in 3d-5d (CuAg) alloys., *Physica B,* 366, 55.
6. T. Das, S. Deb and **A. Mookerjee** (2005), Study of the electronic and elasticproperties of transition metal and actinide carbides, *Physica B : Condensed Matter,* 367, 6.
7. K. Tarafder and **A. Mookerjee** (2005), Optical conductivity in disordered alloys : an approach via augmented space recursion, *J. Phys. Condens Matter,* 17,435.
8. A. Alam and **A. Mookerjee** (2005), Lattice thermal conductivity of disordered binary alloys, *Phys Rev B,* 72, 214207.
9. K. Tarafder, K.K. Saha, A. Alam and **A. Mookerjee** (2006), Response functions in disordered alloys : an approach via the augmented space recursion, *J. Phys. Conf. Series*,29, 27.
10. M. Kabir, **A. Mookerjee** and D. G. Kanhere(2006), Large magnetic moments and anomalous exchange coupling in As-doped Mn Clusters, *Phys Rev B,* 73, 075210.
11. A. Alam and **A. Mookerjee** (2006), Lattice thermal conductivity of disordered NiPd and NiPt alloys, *J. Phys. Condens Matter,* 18,4589.
12. A. Chakrabarti, M. Chakraborty and **A. Mookerjee** (2006), Study of the one dimensional Holstein model using the augmented space approach, *Physica B : Condens Matter,* 368.

Collaborative research & project work

1. *Theoretical and Experimental Study of Magnetic Alloys*, Olle Eriksson, University of Upsala, Sweden, funded by Asia-Sweden Consortium, 2006-2009.
2. *Electronic and Magnetic Structure of binary alloys,* Arun K Mishra, L.H. Mishra Darbhanga University, funded by DST, India, 2006-2009.

3. *Network Project on Alloys,* Mesbahuddin Ahmed, University of Dhaka, funded by ICTP, Trieste, Italy, 2004-2007.

4. *Study of Metallic and Bimetallic Clusters*, D.G. Kanhere, University of Pune, funded by DST, India, 2004-2007.

Teaching programme

1. *Mathematical Methods*, Post-BSc Integrated Ph.D. in Chemical Sciences, SNBNCBS, Autumn Semester, 2005.

2. *Advanced Statistical Mechanics*, Post B.Sc. Integrated Ph.D. in Physical Sciences and Post-M.Sc., Spring Semester, 2006.

3. *Quantum Mechanics II*, Post-B.Sc. Integrated Ph.D. in Physical Sciences, Spring Semester, 2006 (part of the course)

Supervision of students

i) Students doing Ph. D

1. Atisdipankar Chakrabarti, Calcutta University
2. Monodeep Chakraborty, West Bengal University of Technology
3. Mukul Kabir,Jadavpur University
4. Aftab Alam, Jadavpur University
5. Kartick Tarafder, Jadavpur University

ii) Students received degree of Ph. D.

1. Nityananda Das, *Augmented space recursion and its applications*, Jadavpur University, 2005.
2. Tapas Mitra, *Quantum transmittance*, Jadavpur University, 2005.
3. Durga Paudyal, *Electronic, magnetic structure and phase stability in substitutional binary alloys : a theoretical study*, Jadavpur University, 2005.
4. Kamal Krishna Saha, *Optical properties of compounds and disordered alloys*, Jadavpur University, 2005.

Talks given

1. *Theoretical approaches to electronic structure and response functions* at Department of Physics, Tezpur University, Tezpur, 20 April 2005.

2. *Response functions in disordered allloys : an approach via the augmented space recursion* at the Chinese Academy of Sciences, Beijing, 9 September 2005.

3. *Thermal response in disordered alloys* at Department of Physics, Indian Institute of Technology, Kanpur, 4 November 2005.

4. *Optical response in disordered alloys* at Indian Institute of Science, Bangalore, 20 February 2006.

5. *Thermal conductivity in disordered NiPd and NiPt* at Department of Physics, Jawaharlal Nehru University, New Delhi, 3 March 2006.

6. *Configuration averaging in disordered systems* at Indian Association for the Cultivation of Science, Kolkata, 8 March 2006.

7. *Studies in electronic structure and phase stability* at Department of Physics, Patna University, 27 March 2006.

Other academic/educational activities

i) Membership in committees/bodies

Member, Governing Body, Kendriya Vidyalaya II, Kolkata

ii) Member, Executive Committee, Indian Society for Non-linear Analysis

Sugata Mukherjee

Collaborative research work

Aspects of Ultrafast processes in Clusters and Solids. initiated collaboration with Prof. Martin Garcia, (Univ Kassel)

Teaching Programme

1. *Quantum Many-body Theory,* Post- M.Sc. Students (Ist Semester), August -October 2005.

2. *Electromagnetic Theory II,* Post-B.Sc. Students (IInd Semester), January - Feburary 2006.

Talks given

1. Gave a lecture on *Molecular Dynamics Simulations in Electronic Structure Calculations,* Meeting on Materials Modelling, held at IACS, Jadavpur, 8-9 March 2006.

2. Gave poster on Surface segregation in bimetallic Nanoparticles at In-house meeting in SNBNCBS, March 2006.

Other academic / educational activities

i) Visits, conferences, symposia

Attended *Indo-US Conference on Novel Materials,* Kolkata, October 2005.

ii) Membership in conmittees/bodies

1. Co-convener, Theoretical Physics Seminar Circuit.
2. Head, Physics of Materials Group, April 2005 – March 2006.
3. Member-Secretary Post-M.Sc. Teaching Committee, June – December 2005.
4. Convener, Admission Committee (since March 2006).
5. Ph.D. Viva-voce examiner of Mr. A. De Sarkar (SINP) at Jadavpur Univerity.

Pratip Kumar Mukhopadhyay

Publications

i) Journals

1. Uday Kumar, Emad Badawi and **P. K. Mukhopadhyay**(2005),Characterization of Al-Mg alloys (50xx) by using Positron Annihilation, X-ray Diffraction and Vibrating Reed Techniques. *Int. J. Mod. Phys. B. 19, 3397-3404.*

2. B.K. Nath, P.K. Chakrabarti, S. Das, Uday Kumar, **P.K. Mukhopadhyay** and D. Das (2005), Mössbauer studies on nanoparticles of zinc substituted magnesium ferrite, *Journal of Surface Science and Technology, 21 (3-4)* 1-14.

3. P. Dey, T. K. Nath, Uday Kumar, and **P.K. Mukhopadhyay** (2005), Effect of nanosize modulation of granular $La_{0.67}Sr_{0.33}MnO_3$ manganites on temperature-dependent low-field spin polarized tunneling magnetoresistance, *J. Appl. Phys.* 98, 014306.

4. Arvind Sinha, Suprabha Nayar, B.K.Nath, Deepankar Das and **P.K. Mukhopadhyay** (2005), Magnetic field induced synthesis and self assembly of super paramagnetic particles in a protein matrix, *Colloids and Surfaces B,* 43, 7 – 11.

ii) Proceedings

1. B. K. Nath, P. K. Chakrabarti, S. Das, Uday Kumar, **P. K. Mukhopadhyay**, K. Goswami, D. Das (2005), Mössbauer spectroscopy and AC susceptibility of nano-crystalline $Ni_xCu_xZn_{(1-2x)}Fe_2O_4$ (x = 0.1, 0.2, and 0.3), presented in *Condensed Matter Days*, Berhumpur, Orissa.
2. Uday Kumar, Mitali Banerjee, S. K. Choudhury, D. Das and **P. K. Mukhopadhyay** (2005), Free Volume effects in Bi2223 studied through positron annihilation studies, presented in *Condensed Matter Days*, Berhampur, Orissa.
3. S. R. Burman, Uday Kumar and **P. K. Mukhopadhyay** (2005),Investigations into the behaviors of a series of shape memory alloys $Ni_{2+x}Mn_{1-x}Ga$, orally presented in *Condensed Matter Days,* Berhampur, Orissa.

Collaborative research & project work

1. *Ferromagnetic Shape Memory Alloys,* collaboration with a group in the UGC DAEF, CSR, Indore Centre, Indore.
2. *Nano particles,* collaboration with a group in UGC-DAEF, CSR, Calcutta Centre, Kolkata
3. *Magnetic Alloys,* with Uppsala University and a theoretical group in SNBNCBS, SIDA, January 2006, for 3 years to investigate the theoretical and experimental aspects of magnetic alloys in this project.

Teaching programme

1. *Methods of Experimental Physics, Phy 391*, Post-B.Sc. Integrated Ph.D. at SNBNCBS, Autumn Semester 2005.
2. *Digital Electronics part of Phy 191*, Post-B.Sc. Integrated Ph.D. at SNBNCBS, Spring Semester 2006.

Supervision of students

i) Student doing Ph. D

Ms. Mitali Banerjee, 2005

ii) Post-doctoral fellows

Dr. Uday Kumar, SNBNCBS.

iii) Others

Supervised summer projects of

1. Mr. Tanmoy Chakroborty
2. Mr. Saikat Mukhopadhyay (May – July, 2005)

Talks given

1. *Nano and Thin films work in LCMP,* Indian Association for the Cultivation of Sciences, 9 August 2005.
2. *High and low field measurements on bulk, film and nano magnetic alloys and systems*, Workshop on the applications of high magnetic field in Condensed Matter Science, UGC-DAEF, Calcutta Centre, 6 September 2005.

3. *Superconductivity,* on the occasion of silver jubilee celebration, NIT Silchar, 24 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended the WSoP–05, IYP, Indian Physical Society, SNBNCBS, 9 – 10 April 2005.
2. Organized the *National symposium on Physics in the Trails of Einstein* at SINP, 10 – 11 November 2006.
3. Attended the National High Magnetic Laboratory proposers' meeting, UGC DAEF, Calcutta Centre, 6 September 2005.

ii) Membership in committees/bodies

1. Member of the proposing committee of a National High Magnetic Laboratory, UGC-DAEF, Calcutta Centre, SNBNCBS, VECC and IACS conglomerate.
2. Member of WSoP-05, IYP Committee, constituted by the Indian Physical Society under the auspices of the World Year of Physics, for exposing the senior school children of West Bengal to Physics.

iii) Others

1. Member of the erstwhile Transport Committee, SNBNCBS.
2. Member of the Technical Committee, SNBNCBS.
3. Mechanical workshop has been setup and functioning.
4. Organized a visit of nineteen school children (meet the scientists) under World Year of Physics program, from Lady Queen's Mission School, 11 May 2005.
5. Opted as Co-Pi for one of Prof. A.K.Majumdar's project grant from DST.

   (WSoP-05, IYP: Workshop-cum-Seminars on Physics, 2005, International Year of Physics).

Nilakantha Nayak

Publications

i) Journals

1. **N. Nayak**, R. N. Deb and B. Dutta- Roy (2005), Squeezed spin states and pseudo Hermitian operatorse, *J. Opt. B*,7, S761.
2. R. N. Deb, M. Sebawe Abdalla., S. S. Hassan, and **N. Nayak** (2006) Spin squeezing and entanglement in a dispersive cavity, *Phys. Rev. A* 73, 053817.

Collaborative research & project work

1. Collaboration with Professor Binayak Dutta Roy in research on spin squeezing and their states. Mr. R. N. Deb of Darjeeling Government College is doing Ph. D. degree under supervision.
2. Collaboration with Dr. A. S. Majumdar for seven years with Mr. B. Ghosh doing his Ph. D. degree under joint supervision.
3. Collaboration with Professor S. S. Hassan of University of Bahrain, Bahrain has been initiated to tackle some problems in spin squeezing.

Supervision of students

Students doing Ph. D

1. Biplab Ghosh, Jadavpur University
2. Ram Narayan Deb

Talks given

1. *Squeezed spin states and pseudo-Hermitian operator* at Department LPMO, Institut FEMTO-ST, Besancon, France, 3 May 2005.
2. *Information transfer using cavity-QED* Laboratoire Kastler Brossel, Ecole Normale Superiure, Paris, France, 9 May 2005.
3. *Information transfer using cavity-QED* at Annual In-House Meeting, SNBNCBS, 23 - 24 March 2006.
4. *Information transfer using cavity-QED* at the Department of Applied Mathematics, Calcutta University, 29 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended the *International Conference on Squeezed States and Uncertainty relations* at Institut FEMTO-ST, Besancon, France, 2-6 May 2005.
2. Academic visit to Laboratoire Kastler Brossel of the Ecole Narmale Superiure, Paris, France, 9-10 May 2005.
3. Chaired *The National Symposium on Quantum Mechanics and Nonlinear Dynamics* at the Department of Applied Mathematics, Calcutta University on 29 March 2006.

ii) Membership in committees/bodies

1. Member, Academic Programme Advisory Committee, SNBNCBS.
2. Vigilance Officer, SNBNCBS.

Samir K. Pal

Publications

i) Journals

1. R. Sarkar, A. K. Shaw, S. S. Narayanan, F. Dias, A. Monkman and **S. K. Pal** (2006), Direct observation of protein folding in nanoenvironments using a molecular ruler, *Biophysical Chemistry,* 123, 40.
2. R. Sarkar, A. K. Shaw, M. Ghosh and **S. K. Pal** (2006), Ultrafast photoinduced deligation and ligation dynamics: DCM in the Micelle and Micelle-Enzyme Complex, *J. Photochem. Photobiol. B* 83, 213.
3. P. Hansia, S. Vishveshwara and **S. K. Pal** (2006), Tryptophan-water interaction in Monellin: Hydration patterns from molecular dynamics simulation, *Chem. Phys. Lett.* 420, 517.
4. A. K. Shaw, R. Sarkar, and **S. K. Pal** (2005), Direct observation of DNA condensation in a Nano-Cage by using a molecular ruler, *Chem. Phys. Lett*. 408, 366.

ii) Book

Rupa Sarkar and **S. K. Pal,** Modulation of water dynamics: A novel approach to control enzyme functionality,*Photo/Electrochemistry & Photobiology in the Environment, Energy*

and Fuel (PEPEEF '2006), Publisher: Research Signpost, Editor: Satoshi Kaneco, Japan

Collaborative research & project work

1. *International Collaboration*

   i) Professor Andy Monkman, University of Durham, UK.

   ii) Professor Klaus Gerwert & Dr. Carsten Kotting, University of Bochum, Germany.

2. *National Collaboration*

   Professor Saraswathi Vishveshwara, MBU, Indian Institute of Science, Bangalore

3. *On going Project*

   To Study the Role of Water Molecules in Protein Function by Using Steady State and Time-resolved Emission/Absorption Spectroscopy. funded by DST, India

Teaching programme

(i) *Number of Courses Taught*

CH416, PBIR (*Chemical Science*), 1st semester

(ii) *Number of courses developed*

The content of the electronics and instrumentation part of the courses for PBIR Physical Sciences, PHY191 and PHY 291 (syllabus), and full course for Chemical Sciences, CH416 (syllabus) were designed and developed.

Supervision of students

i) *Students doing Ph. D.*

1. Rupa Sarkar, UGC-JRF, Biophysics, Jadavpur University
2. Ajay Kumar Shaw, UGC-JRF, Biophysics, Jadavpur University
3. Shankar Narayanan, CSIR-JRF, Biophysics, Jadavpur University
4. Debapriya Banerjee, CSIR-JRF, Biophysics, Jadavpur University

Talks given

1. *Ultrafast dynamics and protein function* at Department of Physics, University of Durham, UK, June 2005.

2. *Ultrafast fluorescence spectroscopy as diagnostic tool for iomolecular malfunction* at Department of Biophysics, University of Bochum, Germany, October 2005.

Other academic/educational activities

i) Visits, conferences, symposia

Academic visit to Department of Physics, University of Durham, UK and Department of Biophysics, University of Bochum, Germany, October 2005.

ii) Membership in committees/bodies

1. Convener, Technical Committee.
2. Member, Admission Committee.
3. Member, Annual Report Committee.

Samir K. Paul

Publications

Journals

Manu Mathur, and **Samir K. Paul** (2005) Coherent states with Su (2) and Su (3) charges, *Jour. :Phys. A*, 38, 7863.

Collaborative research & project works

1. *Ranjan Chaudhury (SNBNCBS)* Studing the role of Wess-Jumino term in two dimensional anisotropic Heisenbery ferro and anti-ferromagnets explicitly on lattice. This enables to see the topological excitations explicitly. In this direction first one has to look at two dimensional quantium KT model to check the response of Wess-Jumino term for vortex, anti-vortex type excitations.Lastly one has to calculate the dynamicalture functions.

2. *Siddhartha Sen (School of Mathematics, Trinity College, Dublin, Ireland),* To study resolving A-D-E type singularities in the perspective of String Duality. This is in continuation of previous work.

Teaching programme

Mathematical Physics, summer programme classes, SNBNCBS, 24 May - 29 June 2005.

Talks given

On the existence of topological excitations on Quantum Heisenberg ferromagnets and anti-ferromagnets in two dimensions, in one day symposium on Quantum Mechanics, 29 March 2005, Department of Applied Mathematics, University of Calcutta.

Other academic/educational activites

Visit, conferences, symposia

Participated in the *Advanced Instructional School in Algebraic and Differential Topology* at Ist Kolkata during 5 - 31 December 2005, supported by NBHM.

Arup Kumar Raychaudhuri

Publications

Journals

1. Aveek Bid, Achyut Bora and **A. K. Raychaudhuri** (2005), Low frequency conductance fluctuations (1/f_ noise) in 15nm Ag nanowires-Implication on its stability**,** *Physical Review B 72*, 113415.

2. Sohini Kar, J. Mitra and **A. K. Raychaudhuri**, (2005), Temperature dependence of the gap in the density of states near the Fermi level in a hole doped manganite, *Solid State Communication,* 136,410-415.

3. Loveleen K. Brar, Priya Rajdev, **Arup K. Raychaudhuri**, Dipankar Chatterji (2005)**,** Langmuir monolayer as a tool towards visualization of a specific DNA-protein complex, *Langmuir* 21, 10671.

4. Barnali Ghosh,, Sohini Kar, Loveleen K. Brar and **A. K. Raychaudhuri** (2005), Electronic transport in nanostructured films of $La_{0.67}Sr_{0.33}MnO_3$, *J.Appl.Phys*, 98, 094302.

5. Mandar A .Paranjape, K. Shantha Shankar and **A. K. Raychaudhuri** (2005), Electronic transport in nanostructured thin films of perovskite manganite $La_{0.67}Ca_{0.33}MnO_3$: Role

of grain boundaries, *Journal of Physics D: Appl. Phys*. 38, 3674.

6. Aveek Bid, Achyut Bora and **A. K. Raychaudhuri** (2006), 1/f noise in nanowires- *Nanotechnology* 17, 152.

7. K.Shantha Shankar and **A. K. Raychaudhuri** (2006), Low temperature polymer precursor based synthesis of nanocrystalline particles of Lanthanum Calcium Manganese Oxide ($La_{0.67}Ca_{0.33}MnO_3$) with Enhanced Ferromagnetic Transition Temperature, *Journal of Materials Research* 21,27-33 .

8. K. S. Nagapriya, **A. K. Raychaudhuri**, Dipankar Chatterji (2006), Direct observation of large temperature fluctuations during DNA thermal denaturation, *Physical Review Letts*. 96, 038102.

Collaborative research & project work

Sponsored projects :

Unit for Nanoscience and Technology

A DST sponsored project on establishment of a Unit for Nanoscience and Technology has been initiated. The project has about 10 members of the faculty of the Center. This is a part of the Nano Science and Technology Initiative (NSTI) programme of the DST. The unit is one of the 8 such units set-up around the country. The unit to is to initiate and strengthen both theoretical and experimental works in this area and also will set-up state of the art synthesis, characterization and measurements facilities. The activities of the unit started with effect from 13 April 2005. A brief report on the activities of the unit is given in a separate section.

Development of Nanocalorimeter

A BRNS project to develop a nanocalorimeter fabricated by advanced lithography technique has been initiated. The work envisages to make the nanocalorimeter as a tool for precision physical and biological measurements.

Supervision of students

i) Students doing Ph. D

1. Manoranjan Ghosh
2. Sudeshna Samanta
3. Venkata Kamalakar
4. Soma Das
5. Tapati Sarkar
6. Saptarshi Mitra
7. Subrata Sarkar

ii) Post-doctoral research workers

1. Dr. Barnali Ghosh (Women in Science project – DST awardee)
2. Dr. Anindya Das

Talks given

1. *NPL Growth of nanomaterials using templates,* colloquia, May 2005.

2. *Scanning Probe Microscopy,* Conference by Veeco India Nanolab, JNCASR, Bangalore, October 2005.

3. *Scanning Probe Microscopy* (2 talks), Advanced School on Materials Characterization, University of Pune, October 2005.

4. *UK Stability and Noise in metal nanowires,* Cambridge University, October 2005.

5. *Phase separation in Oxides,* Bharathidasan University, Annual Meeting Indian Academy of Sciences, November 2005.

6. *Nanoscienciences and Technology*, FICCI, New Delhi, CII -India as R&D Hub, November 2005.

7. *Nanosciences and Technology*, India-US HICG meeting, MEA, New Delhi, December 2005.

8. *Science of Small things,* St.Xavier's College, Kolkata, December 2005.

9. *Basic Physics of Electronic Transport* (6 talks), SERC School, SINP, Kolkta, January 2006.

10. *Kolkata growth of Nanomaterials using templates*,Conference on Nanomaterials-Synthesis and applications, Jadavpur University, Kolkata, January 2006.

11. *Electronic transport in the Ferro-magnetic insulating state of manganites,* Indo-Japan Workshop, IISc.,Bangalore, January 2006.

12. *Research Prospects in Nanosciences*, Indo-USA Conclave by Indo-US Forum,New Delhi, February 2006 .

13. *Nanomanganites,* ICONSAT, IIT Delhi, ICONSAT, March 2006.

14. *Optical properties of doped ZnO,* 2nd India Taiwan Workshop on Nanosciences, INSA, New Delhi, March 2006 .

15. *Nanolithography*, India-UK Workshop, British Council, New Delhi, March 2006.

16. *Low temperature growth of nanomaterials,* National Workshop on Composites, IIT, Kharagpur, Kolkata centre, March 2006

17. *Instabilities in Atomic Force Microscope,* Indo-Australian Workshop on Nanotechnology, IISc., Bangalore, March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. *Advanced School on Materials Characterization*, University of Pune, Pune
2. *UK India-UK meeting on Nanotechnology,* Cambridge University
3. *Annual Meeting Indian Academy of Sciences*, Bharathidasan University
4. *CII -India as R&D Hub*, FICCI, New Delhi
5. *India-US HICG meeting*,MEA,New Delhi
6. *Indo-Japan Workshop*,IISc.,Bangalore
7. *Indo-USA Conclave* by Indo-US Forum, New Delhi
8. *ICONSAT2006*, IIT, Delhi
9. *India-Taiwan Workshop,* INSA, New Delhi
10. *Indo-Australian Workshop on Nanotechnology*, IEEE, Bangalore
11. *Nanosingapore 2006*, Singapore

ii) Membership in committees/bodies

1. DST Chairman, *Programme Advisory Committee on Condensed Matter Physics and Materials Science*

2. DST Chairman, *Subject Committee (Physics)* and Member, *Programme Advisory Board*. Fund for Infrastructure in Science and Technology (FIST).
3. *DST Member*, Nano Science and Technology Initiative (NIST)
4. *DST Member*, Programme Advisory Committee, International Division.
5. *Member, Board of Governors*, Indian Institute of Science Education and Research, Pune.

Tanusri Saha-Dasgupta

Publications

i) Journals

1. **T. Saha-Dasgupta**, Molly De Raychaudhury, D. D. Sarma (2006), Origin of ferromagnetism and its pressure and doping dependence in $Tl_2Mn_2O_7$, *Phys. Rev. Lett*, 96, 087205.
2. Soumendu Datta, Debasish Chaudhuri, **Tanusri Saha-Dasgupta**, Surajit Sengupta (2006), Electrical transport in deformed nanostrips: electrical signature of reversible mechanical failure, *Euro. Phys. Lett*, 73, 19195.
3. M. Hoinkis, M. Sing, J. Schäfer, M. Klemm, S. Horn, H. Benthien, E. Jeckelmann, **T.Saha-Dasgupta**, L. Pisani, R. Valentí, and R. Claessen (2005), Electronic structure of the spin-1/2 quantum magnet TiOCl, *Phys. Rev. B* 72, 125127.
4. R. Viswanatha, S. Sapra, **T. Saha-Dasgupta**, and D. D. Sarma (2005), Electronic structure of and quantum size effect in III-V and II-VI semiconducting nanocrystals using a realistic tight binding approach, *Phys. Rev. B* 72, 045333.
5. **T. Saha-Dasgupta**, Z. S. Popoviæ,and S.Satpathy (2005),Density functional study of the insulating ground states in $CaFeO_3$ and $La_{1/3}Sr_2FeO_3$ compounds, *Phys. Rev. B* 72, 045143.
6. **T. Saha-Dasgupta**, R. Valentí, F. Capraro, and C. Gros (2005), $Na_2V_3O_7$: A Frustrated Nanotubular System with Spin-1/2 Diamond Ring Geometry, *Phys. Rev. Lett.*95, 107201.

Collaborative research & project work

Electronic Structure of unconventional colossal magneto-resistive compounds

Collaboration: D.D. Sarma (Indian Institute of Science, Bangalore) funded by Department of Science and Technology for the period of 2004-2007.

Study on the pyrochlore compound, $Tl_2Mn_2O_7$, which has been published in Phys. Rev. Lett has been finished. The detail paper is under preparation. Currently focus is on the family of chalcospinels, which are ferromagnetic with a large variation of Tc. While some members of the family are insulators (therefore potential candidate for biferroic systems) others are metals. Some are half-metals with colossal magneto-resistive properties. With electronic structure analyse attempt in made to understand the large variation of properties in this interesting class of compounds. Some of supporting experiments are being carried out in the group of Prof. D. D. Sarma.

Unravelling chemical bonding and physical properties of novel materials using Wannier- like functions

Collaboration: O.K. Andersen (Max-Planck Institute, Stuttgart), Maria-Roser Valenti (Univeristy of Frankfurt) funded by Max-Planck Society for the period of 2005-2010.

Study on novel materials is being continued. The current interest is in the study of organometallic systems with tunable properties. Also interested in pressure induced Insulator-Metal transition in low-dimensional quantum spin system TiOCl, understanding of properties of Triazole compound which has potential application as optical switches, and issues like formation of zhang-rice singlets in case of realistic parameters of high Tc cuprates.

Teaching programme

Quantum Theory of many-electron system, Post-Msc at SNBNCBS, Autumn Semester, 2005.

Supervision of students

i) Students doing Ph. D

1. Badiur Rahaman, Jadavpur University.
2. Soumendu Datta, Jadavpur University.
3. Swarup Saha (project student).
4. Dwipesh Majumder

ii) Students received Ph.D.

Durga Paudyal (Thesis on *Electronic structure and Phase Stability in Alloys*), Jadavpur University, 2005.

iii) Post-doctoral Fellows/Research Associates

Molly De- Raychaudhury *(DST project, SNBNCBS)*

Talks given

1. *Understanding physics and chemistry of novel materials* at SINP, 12 April 2006.
2. *Quantum spin systems : a fascinating class of compounds* at IISc., Bangalore, 21 February 2006.
3. *Magnetism in CMR material $Tl_2Mn_2O_7$ and its dependence on pressure and doping* at IISc., Banglore, 1 February 2006.
4. *Linear muffin-tin orbital method and its variant* at JNCASR, Bangalore, 18 January 2006.
5. *Electronic structure and phase formation in alloys* at University of Pune, 23 December 2005.
6. *Alloy phase stability* at ICAMD conference, Goa, 15 December 2005.
7. *TiOCl and $Na_2V_3O_7$ – two spin gap systems* at Indo-US conferences, 28 October 2005.
8. *$Na_2V_3O_7$: a new nano-tubular system with frustration* at Psi-k conference Schwäbisch Gmünd, Germany, 18 September 2005.
9. *TiOCl – a layered quantum spin system with novel propertie* at Psi-k conference Schwäbisch Gmünd, Germany, 18 September 2005.
10. *Low-dimensional quantum spin systems* at Telluride meeting on oxides, 4 August 2005.

Other academic/educational activities

i) Visits, conferences, symposia

1. Organized (jointly with DD Sarma, IISc and U. Waghmare, JNCASR) the *Indo-*

EU Thematic meeting on Computational Material Science, 20-22 February 2006.

2. Attended Indo-Japan joint seminar on *Novel giant-magnetoresistive materials and their electronic structures,* 29 January - 2 February 2006.
3. Attended Winter School *on Computational Approaches in Materials Science,* 18-21 January 2006.
4. Attended *Intrnational Conference on Advanced Materials Design and Development,* 14-16 December 2005.
5. Organized (jointly with David Singh, Oak Ridge) *Indo-US conference on Novel and Complex Materials,* 26-29 October 2005.
6. Attended *Psi-k Conference* during 17-21 September 2005.
7. Academic visit to University of Frankfurt and MPI, Stuttgart during September-October 2005.
8. Attended *Telluride Meeting on Oxides*, 1-4 August 2005.
9. Academic visit to University of Missouri, USA during July-Aug 2005.

Awards/Honours received

Swarnajayanti Fellowship in Physical Sciences, awarded by DST, 2005.

M. Sanjay Kumar

Teaching programmes

Electromagnetic Theory I, Post-B.Sc Integrated Ph. D at SNBNCBS, Autumn Semester, 2005

Other academic/educational activities

ii) Membership in committees/bodies

1. *Member-Secretary, Post-B.Sc. Teaching Committee for Physical Sciences*, SNBNCBS, Kolkata.
2. *Convenor, Post-B.Sc. Integrated Research Progamme in Physical Sciences* of West Bengal University of Technology, Kolkata.

Surajit Sengupta

Publications

i) Journals

1. A. Sengupta, **S. Sengupta** and G.I. Menon (2005), Probing disordered substrates by imaging the adsorbate in its fluid phase,*Europhys. Lett.* 70, 635.
2. A. Chaudhuri**, S. Sengupta** and Madan Rao (2005), Stress relaxation in a perfect nano- crystal by coherent ejection of lattice layers, *Phys. Rev. Lett.*, 95, 266103.
3. D. Chaudhuri and **S. Sengupta** (2006), Direct test of defect-mediated laser-induced melting theory for two-dimensional solids, *Phys. Rev. E*, 73, 011507.
4. S. Datta, D. Chaudhuri, T. Saha-Dasgupta and **S. Sengupta** (2006), Electrical transport in deformed nanostrips: electrical signature of reversible mechanical failure, *Europhys. Lett.* 73, 765.

i) Proceedings

D. Chaudhuri, **S. Sengupta** (2005), Mechanical Failure of a Small and Confined Solid, *Ind. J. Phys.* 79, 941.

Subodh Kumar Sharma

Publications

i) Journals

1. **S.K. Sharma** and Srilekha Banerjee (2005), Volume concentration and size dependence of diffuse reflectance in a fractal tissue model, *Med. Phys.* 32, 1667.
2. R. K. Saha and **S . K. Sharma** (2005), Validity of a modified Born approximation for a pulsed plane wave in acoustic cattering problems, *Phys. Med. Biol*. 50, 1.
3. Ashim K. Roy and **Subodh K. Sharma** (2005), A simple analysis of extinction spectrum of a size distribution of Mie particles, *J. Opt. A: Pure Appl Opt. 7*, 675.

ii) Review Articles

S. K. Sharma (2006), Light scattering and absorption characteristics of optically soft particles in *Light Scattering Reviews Vol. 1* (Ed. Alexander A Kokhanovsky) (Praxis publishing, Chichister, UK) p.73.

Collaborative research & project work

1. *Ultrasound scattering by soft tissues* Collaborator: Professor S K Sen, Saha Institute of Nuclear Physics, Kolkata, 2004 onwards.

   Inverse problem in optical scattering
   Collaborator : Dr. A. K. Roy, Indian Statistical Institute, Kolkata, 2002 onwards.

2. *Light scattering by soft tissues,* Collaborator: Dr. Srilekha Banerjee, SNBNCBS, Kolkata, 2001 onwards.

Supervision of students

i) Students doing Ph. D

1. R. K. Saha, Saha Institute of Nuclear Physics, Kolkata.
2. M. K. Roy, SNBNCBS.

Talks given

Recent light scattering studies, at SNBOSEFEST'96, 23 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Presented a paper at *NATO Advanced Research Workshop :Optics of Biological Particles* at Novosibirsk, Russia during 3-6 October 2005.
2. Academic visit to Indian Institute of Science, Bangalore during 8-10 June 2005..

ii) Membership in committees/bodies

Member, Board of Studies, Department of Applied Optics and Photonics, Calcutta University, Kolkata.

P. Singha Deo

Publications

i) Journals

1. **P. Singha Deo** (2005), Larmor precession time,Wigner delay time and the local

density of states in aquantum wire., *International Journal of Modern Physics B,* 19, 899.

2. **P. Singha Deo**,P.Koskinen, M Manninen (2005), Charge fluctuations in coupled systems: ringcoupled to a wire or ring, *Phys. Rev.B,* 72, 155332.

Other academic/educational activities

Visits, conferences, and symposia

1. *Indo-Israel* at Toshali-sand in Puri, in 17 - 21 April 2005.
2. *Nanoscopic systems* at SINP in March 2006.

P. A. Sreeram

Collaborative research & project work

1. *Unit for Nanoscience and Technology, S. N. Bose National Centre for Basic Sciences :* The work involves the study of Atomic Force Microscopy. The action of AFM has been modelled for both static and dynamic modes. The work has been completed and is in the process of being written up for publication.

Teaching programme

1. *Mathematical Physics I,* PBIR, 1st Semester, 2005.
2. *Effective Communication*, PBIR, 4th Semester, 2005-06.

Talks given

Nuts and Bolts of Atomic Force Microscope : A nonlinear understanding, S. N. Bose National Centre for Basic Sciences, January 2006.

II. Research Associates

Sumita Datta - *Research Associate*

Publications

i) Journals

Ehrenfest's Equation for the Hydrogen Atom : Passage to the Kepler Orbit, **S. Datta** and J. K. Bhattacharjee, *Physics Education* Vol 22,Number 2, 139, July - September 2005.

Talks given

1) *Bose Einstein Condensation in alkali gases at finite temperature* invited talk at Topical Conference on Atomic, Molecular and Optical Physics organised by the Indian Association for the Cultivation of Science, Kolkata.

Collaborative research and project work

i) Projects Data completed

Succesfully completed the DST project under Young Scientist Scheme on the *Properties of thermodynamic system by the path integral Monte Carlo technique (quantum approach) - an application to alkali gases* with the following outcome :

1) Properties of selected diatomics using Variational Monte Carlo methods, **S. Datta**, S. A. Alexander, *J. Chem Phys*, 120, 3642 (2004).

2) High-Energy Electron Scattering from selected Diatomics using Monte Carlo Methods, S . A. Alexander, **S. Datta** and R. L. Coldwell (Submitted to *Chemical Physics Letters*)

3) Finite Temperature Excitations of an anisotropically trapped Bose gas: A duffusion Monte Carlo study **S Datta** (Cond-mat /0503264) Submitted to *J Stat Mech*.(Theory and experiment)

4) Thermodynamic properties of trapped a trapped Bose gas by diffusion Monte Carlo method, **S Datta**, (Cond-mat/ 0511647) Submitted to *Phys. Lett A*

5) Feynman-Kac path integral approach for the energy spectrum of many boson systems**, S Datta** (Cond-mat//060316) Submitted to *Eur J D*.

ii) Projects to be implemented

Project entitled *Energies and relativistic corrections for ground and excited states of atoms and molecules using high quality trial functions* has been approved for funding under DST Women Scientist Scheme(2005-2006)

Molly De-Raychaudhury - *Research Associate*

Publications

Journals

1. D. B. Ghosh, **Molly De** and S. K. De (2004), Electronic structure and magneto-optical properties of magnetic properties of magnetic semiconductors: Europium Monochalcogenides, *Phys. Rev. B*, 70, 115211.

2. D. B. Ghosh, **Molly De** and S. K. De (2005), Electronic, optical and magneto-optical properties of Gd monopnictides: An LDA+U study, *Phys. Rev. B*, 72, 045140.

Collaborative research & project work

1. *Electronic structure of unconventional CMR compounds*, Dr. T. Saha Dasgupta, SNBNCBS, Prof. D. D. Sarma, IISc, funded by DST, Government. of India, 3 November 2004 - 19 April 2006.

   Unlike the manganites, $TL_2Mn_2O_7$ is not an eg system and hence the usual double-exchange mechanism cannot explain the CMR effect observed in this system. The band structure has been investigated and an effective level diagram has been predicted using the massive downfolding technique. A possible exchange mechanism has been suggested. A kinetic energy-driven mechanism will be operative when the conduction band is placed within the energy gap formed by the large exchange splitting of the localised electrons at the transition metal site. AFM coupling between the Tl-6s and O-p hybridised conduction electrons and the localised Mn t2g states makes the ferromagnetic interaction among the Mn ions robust. Calculation of the exchange interaction strengths has led to an estimation of the exchange parameters confirming a ferromagnetic ground state with nearest neighbour feromagnetic interaction. The effect of doping by Sb at the Mn site has been extensively studied. Enhancement of Tc with doping has been reproduced. Application of isotropic pressure leads to suppression of Tc, which is in agreement with experimental findings. One Phy. Rev. Lett. publication has resulted from this work. Work has begun on Cd and Cu Chalcospinels. Preliminary results indicate a similar exchange mechanism as for $Tl_2Mn_2O_7$. The differences is Cd/Cu-Cr covalencies might have a profound effect on large differences in Tc's (around 100 K in Cd Chalcospinels and 400 K in Cu Chalcospinels). More involved calculations are being performed.

2. *Unravelling chemical bonding and physical properties of novel materials using Wannier-like functions* , Member of Partnergroup project of Dr. T. Saha-Dasgupta of SNBNCBS, Kolkata with Max Planck Institut fur Festkorperforschung, Stuttgart, Germany, funded by Max Planck Society, Germany, 1 January 2005 – 31 December 2007.

   This project involves understanding the fundamental electronic structure of many a complex systems. One of these systems is the La and Y vanadates. Specifically, calculations have already been performed in order to understand the bonding and orbital ordering in La and Y vanadates and reported for publishing at an international journal of repute.

3. *Electronic, magnetic and magneto-optical properties of surfaces, thin films and multilayers*, Principal Investigator- Molly De, Mentor- Dr. T. Saha-Dasgupta, SNBNCBS, funded by DST, Govt. of India, technically approved on 6 June 2005.

   The electronic properties of low-dimensional systems may be diametrically di erent from its bulk. This has been already found to be true in transition metal systems. They exhibit a variety of exotic phonomena like magnetic surfaces of non-magnetic bulk, AFM coupling between two magnetic layers with a non-magnetic spacer, GMR ect and unpredictability of the magnetic properties on changing dimensions make surfaces, thin

films and multilayers not only complex but also interesting. Moreover the prospect of technological applications is heightened by the small dimension as in case of high density data storage devices. The magneto-optical (MO) spectrum calculations have been scarcely reported for transition metal surfaces, thin films and multilayers. Strong surface and quantum confinement effects in thin films indicate that a proper choice of the thickness of the film can may lead to a tuning of MO signal. To this end, calculations have been started on transition metal surfaces with stress on understanding the exchange mechanism and predicting their MO properties. LMTO, LAPW and pseudo-potential methods are being employed to obtain the basic band structure and special attention is being paid at present in the geometry of the slab structure using supercell technique.

Talks given

Magnetism in CMR compound $Tl_2Mn_2O_7$, Indo-US Conference on Novel and Complex Materials, held at SNBNCBS, 27 October 2005.

Other academic/educational activities

Visits, conferences, symposia

1. Presented a poster entitled *Origin of* ferromagnetism in colossal magnetoresistive *$Tl_2Mn_2O_7$* at the In-house Meeting of SNBNCBS , held at SNBNCBS on 28-29 January, 2005.

2. Presented a Poster *Magnetism in CMR compound $Tl_2Mn_2O_7$* at Indo-US Conference on Novel and Complex Materials, SNBNCBS, Kolkata, 26-29 October 2005.

Uday Kumar – *Research Associate*

Worked as a Research Associate, in the LCMP with Dr. P.K.Mukhopadhyay.

Prepared samples of AlFe system, for working in the SIDA (Swedish International Development Association) project between the Centre and Uppsala University in Sweden.

Worked on measurements of susceptibility for the ferromagnetic shape memory alloy systems.

Worked on nano particle systems with UGC-DAEF, CSR, Calcutta centre and IIT/Kharagpur.

Publications

Journals

1. B.K. Nath, P.K. Chakrabarti, S. Das, Uday Kumar, P.K. Mukhopadhyay, K. Goswami, D. Das, Mössbauer spectroscopy and AC susceptibility of nano-crystalline $Ni_xCu_xZn_{(1-2x)}Fe_2O_4$ (x = 0.1, 0.2, and 0.3) Presented in Condensed Matter Days 2005, Berhumpur, India.

2. **Uday Kumar**, K.G. Padmalekha, P.K. Mukhopadhyay, Durga Paudyal, Abhijit Mookerjee (2005), Magnetic transition in Ni-Pt alloy systems: Experiment and Theory *Journal of Magnetism and Magnetic Materials*, 292, 234-240.

3. P. Dey, T. K. Nath, **Uday Kumar**, P. K. Mukhopadhyay (2005), Effect of nanosize modulation of granular $La_{0.67}Sr_{0.33}MnO_3$ manganites on temperature dependent low field spin polarized tunneling magnetoresisitance, *Journal of Applied Physics*, 98, 014306.

4. B.K. Nath, P.K. Chakrabarti, S. Das, **Uday Kumar**, P.K. Mukhopadhyay and D. Das (2005), Mössbauer studies on nanoparticles of zinc substituted magnesium ferrite, J*ournal of Surface Science and Technology*, No. 3-4, 21 1-14.

5. **Uday Kumar**, Emad Badawi and P. K. Mukhopadhyay (2005), Characterization of Al-Mg alloys (50xx) by Using Positron Annihilation, X-ray Diffraction and Vibrating Reed Techniques, *International Journal of Modern Physics B*, 19, 3397-3404.

6. **Uday Kumar,** Mitali Banerjee, S. K. Choudhury, D. Das and P. K. Mukhopadhyay, Free Volume effects in Bi2223 studied through positron annihilation studies *Presented in Condensed Matter Days 2005, Berhumpur, India.*

7. S. R. Burman, **Uday Kumar** & P. K. Mukhopadhyay, Investigations into the behaviors of a series of shape memory alloys $Ni_{2+x}Mn_{1-x}Ga$ *Orally Presented in Condensed Matter Days 2005, Berhumpur, India.*

Manidipa Mitra – *Research Associate*

Talks given

Jahn-Teller coupled charge density wave in a two orbital double exchange system, SERC School on Condensed Matter Physics held at Saha Institute of Nuclear Physics, Kolkata on 6 January 2006.

Other academic / educational activities

i) Visits, conferences, symposia

Indo-US Conference on Novel and Complex Materials, Kolkata, 26 - 29 October 2005.

ii) Poster presentations

1. *Jahn – Teller coupled charge density wave in a two orbital double exchange system,* Indo-US Conference on Novel and Complex Materials, Kolkata, 27 October 2005.
2. *Jahn – Teller coupled charge density wave in a two orbital double exchange system,* Annual In-House meeting,SNBNCBS 2006 on 23-24 March 2006.

III. Students

Aftab Alam - *Sr. Research Fellow*

Supervisor : Prof. Abhijit Mookerjee

Publications

i) Journals

1. **Aftab Alam,** Abhijit Mookerjee (2005), Inelastic neutron scattering in random binary alloys : An augmented space approach, *Phys. Rev. B* 71, 094210.
2. **Aftab Alam,** Abhijit Mookerjee (2005), Lattice thermal conductivity of disordered binary alloys, *Phys. Rev. B* 72, 214207.
3. **Aftab Alam,** Abhijit Mookerjee (2006), Lattice thermal conductivity of disordered NiPd and NiPt alloys, *J. Phys.: Condens Matter 18*, 4589.

i) Proceedings

Kartick Tarafder, Kamal K. Saha, **Aftab Alam,** Abhijit Mookerjee (2006), Response functions in disordered alloys : An approach via the augmented space recursion, *Journal of Physics: Conference Series* 29, 27.

Talks given

1. *Lattice thermal conductivity of disordered alloys* SNBNCBS 28 January 2005.
2. *Thermal transport properties of disordered alloys,* INDO-US Conference on Novel and Complex Materials, SNBNCBS, 26- 29 October 2005.
3. *First principles electrnoic structure calculations of disordered hcp-alloys* at the In-house meeting 2005, SNBNCBS, 23-24 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended *50th DAE Solid State Physics Symposium,* Bhabha Atomic Research Centre and TIFR, Mumbai, 5-9 December 2005.
2. Attended *& Winter School on Computational Approaches to Material Science,*JNCASR, Bangalore, 18-21 January 2006.

ii) Poster presentation

Lattice thermal conductivity of disordered binary alloys at DAE Solid State Physics symposium, BARC and TIFR, Mumbai, 5-9 December 2005.

Md. Manirul Ali—*Sr. Research Fellow*

Supervisor: Dr. Archan S. Majumdar

Publications

i) Journals

1. A. K. Pan, **Md. Manirul Ali** and D. Home (2006), Observability of the arrival time distribution using spin-rotator as a quantum clock, *Phys. Lett. A*, 352, 296

2. **Md. Manirul Ali**, A. S. Majumdar and D. Home (2006),Quantum superarrivals: Bohr's wave- particle duality revisited, *Found. Phys. Lett.* 19, 179.
3. S. Kunkri, **Md. Manirul Ali**, G. Narang, D. Sarkar (2005), Optimal asymmetric cloning machine on a great circle using no-signalling condition, *J. Cal. Math. Soc.* 1, 121.

Other academic/educational activities:

(1) Participated in the Conference *Quantum Physics of Nature & 6th European QIPC Workshop*, 20 - 26 May 2005, Vienna University, Austria
Talk Title: *Observability of the arrival time distribution using spin-rotator as a quantum clock*.

(2) Visited Atomic Institute of the Austrian Universities, Vienna, Austria, May 2005, presented a lecture in the institute Seminar, **Talk Title:** *Arrival time distribution in quantum mechanics*.

Ashish Bakshi - *Junior Research Fellow*

Supervisor: Prof. Jayanta Kumar Bhattacharjee

Other academic/educational activities

1. Attended *Course on Foundational Issues in Quantum Mechanics* by Prof. Jayanta Kumar Bhattacharjee, IACS, January 2006, three months duration.
2. Attended *Course on Quantum Information Theory d*elivered by Dr. Guruprasad Kar at SINP- April 2006, one month duration.

Malay Bandopadhyay – *Sr. Research Fellow*

Supervisor: Prof. Sushanta Dattagupta

Publications

i) Journals

1. **M. Bandyopadhyay** and S. Dattagupta (2006), Dissipative diamagnetism a case study for equilibrium and nonequilibrium statistical mechanics, *J. Stat. Phys.*, 124, 205.
2. **M. Bandyopadhyay (2006),** Dissipative tunneling in 2DEG : effect of magnetic field,impurity and temperature, *J. Stat. Mech. (Letter)*, L03001.
3. **M. Bandyopadhyay**, S. Dattagupta and M. Sanyal (2006), Diffusion Enhancement in a periodic potential under high-frequency space-dependent forcing, *Phys. Rev. E*, 73, 051108.

Talks given

Dissipative diamagnetism a case study for equilibrium and nonequilibrium Statistical Mechanics, SERC school on Condensed Matter Physics Saha Institute of Nuclear Physics.

Landau – Drude diamagnetism , UNANST Group Meeting at S. N. Bose National Centre for Basic Sciences.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended *SERC school on Condensed Matter Physics* SINP, 2 -31 January 2006.

2. Attended a *Winter School on Computational Approach to Material Sciences,* JNCASR, Jakkur, Bangalore, 18-21 January 2006.

ii) Poster Presentation

1. *Dissipative diamagnetism - a case study for equilibrium and nonequilibrium statistical mechanics*, at SNBOSEFEST'06 in SNBNCBS.
2. *Diffusion enhancement in a periodic potential under high-frequency space-dependent f forcing*, at Winter School on Computational Approach to Material Sciences, JNCASR, Jakkur, Bangalore, 18-21 January 2006.

Mrinal Kanti Bera- *Sr. Research Fellow*

Supervisor: Prof. Milan Kumar Sanyal
Co-Supervisor: Prof. Sushanta Dattagupta

Talks given

1. *Gold nanoparticles on water surface* in SERC School on Condensed Matter Physics, Saha Institute of Nuclear Physics, Kolkata, 15 January 2005.
2. *Assesment talk after the completetion of 2 years of Junior Research Fellowship,* SNBNCBS, 29 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended *One day Seminar on Material Physics,* Saha Institute of Nuclear Physics, 19 September 2005.
2. Attended *SERC School on Condensed Mater Physics,*Saha Institute of Nuclear Physics, 3-31 January 2006.

ii) Poster presentation

God nanoparticles on water surface: A x-ray scattering study in SNBOSEFEST'06, SNBNCBS, 23-25 March 2006.

Jayee Bhattacharya – *Sr. Research Fellow*

Supervisor : Dr. Surajit Sengupta

Talks given

Model for Early time microstructure selection in solid-solid transformations, UNANST 2006 at SNBNCBS, 20 April 2006.

Other academic/educational activities

i) Visits, conferences, symposia

Attended School on *Computational Approaches in Materials Science – 2006 (CAMS06)*, at JNCASR, Bangalore, 18-21 January 2006.

ii) Poster Presentation

1. *Kinetics of Martensitic Phase Transitions,* at Computational Approaches in Materials Science – 2006 (CAMS06), JNCASR, Bangalore, 18-21 January 2006.
2. *Study of structural phase transitions in solids*, at SNBOSEFEST '06 (Annual In-House Meeting), SNBNCBS, 23-24 March 2006.

Kunal Bhattacharya – *Jr. Research Fellow*

Supervisor : Dr. S. S. Manna

Proceedings

K.Bhattacharya, Econophysics, G. Mukherjee and S. S. Manna, Detailed simulation results for

some wealth distribution models in in *Econophysics of Wealth Distributions*, Springer, 2005.

Talks given

1. *Study of complex systems*, SRF-qualifying presentation at SNBNCBS, 4 October 2005.
2. *Mobile ad-hoc networks as random geometric Graphs*, Inhouse Meeting-2006, SNBNCBS, 23 March, 2006.

Other academic/educational activities

i) Visits, conferences, symposia

Attended the *International Summer School - Fundamental Problems in Statistical Physics XI (FPSPXI)* during 4-17 September 2005 at Leuven, Belgium.

ii) Poster presentation

Application of Rank-Ordering statistics to minimal spanning tree construction presented at the *FPSPXI,* Leuven.

Navin Chandra- *Sr. Research Fellow*

Supervisor: Prof. Siddhrtha Roy
Co-Supervisor: Dr. Jaydeb Chakrabarti

Other academic/educational activities

i) Visits, conferences, symposia

Attended *IBS-2006, National Symposium on Molecules, Interactions* and *Design*:A *Biophysical Perspective* at Saha Institute of Nuclear Physics, Kolkata, 7-10 January 2006.

ii) Poster presentation

Electrostatics of Protein-DNA and Protein-RNA interactions: Effect of salt over them in SNBOSEFEST'06, SNBNCBS, Kolkata, 23-25 March 2006. The poster was selected for one of the best poster awards.

Chandrasekhar Chatterjee – *Jr. Research Fellow*

Supervisor : Dr. Amitabha Lahiri

Talks given

Confining magnetic string, Inhouse Meeting, SNBNCBS, 24 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

Attended the *International Conference on Noncommutative Geometry and Quantum Physics,* at SNBNCBS, 4-10 January 2006.

Saikat Chatterjee – *Jr. Research Fellow*

Supervisor : Dr. Amitabha Lahiri

Talks given

Generalized vector calculus, Inhouse meeting, SNBNCBS, 24 March 2006.

Other academic/educational activities

Visits, conferences, symposia

Attended the *International Conference on Noncommutative Geometry and Quantum Physics,* SNBNCBS, 4-10 January 2006.

Debasish Chaudhuri – *Sr. Research Fellow*

Supervisor: Dr. Surajit Sengupta

Publications

i) Journals

1. Soumendu Datta, **Debasish Chaudhuri**, Tanusri Saha-Dasgupta, Surajit Sengupta (2006), Electrical transport in deformed nanostrips: electrical signature of reversible mechanical failure, *EuroPhysics Letters*, 73, 765.
2. **Debasish Chaudhuri,** Surajit Sengupta (2006), Direct test of defect mediated melting theory for two dimensional solids, *Physical Review E*, 73, 011507.

Talks given

Confined solids : phases, phase transitions and anomalous failure, Institute of Physics, Bhubaneswar, 31 October 2005.

Other academic/educational activities

Visited Raman Research Institute, Bangalore to work on *Heat conduction in confined solid strip: response to external strain* in collaboration with Dr. Abhishek Dhar, 12 December 2005 - 1 Februrary 2006.

Roby Cherian- *Jr. Research Fellow*

Supervisor: Dr. Priya Mahadevan

Other academic/educational activities

Visits, conferences, symposia

Attended *International Conference on Nano Science and Technology (ICONSAT- 2006),* India Habitat Centre,New Delhi, 16-18 March 2006.

Bipul Das - *Jr. Research Fellow*

Supervisor: Dr. Kalyan Mandal

Talks given

1. *Characterization of Magnetic Easy Axis by MBN Measurements*, SNBNCBS, during Final Semester Project of MSc, May 2005.
2. *Study of Magnetic Properties of* $Co_{83.2}Mn_{7.6}Si_{5.8}B_{3.3}$ *Glass Coated Amorphous Micro-Wire,* SNBNCBS, during Summer Project of MSc, August 2005.

Other academic/educational activities

1. Attended W*orkshop on Application of High Magnetic Field in Condensed Matter Sciences* at UGC-DAE, CSR Kolkata and SNBNCBS on 6 September 2005.
2. Attended *National Workshop on Measurements and Characterization of Magnetic Materials* at SINP, Kolkata, 20-21 April 2006.

Soma Das – *Jr. Research Fellow*

Supervisor : Prof. Arup K. Raychaudhuri

Publications

i) Proceedings

1. **Soma Das**, P.A. Sreeram, Arup K. Raychaudhuri, T.Phanindra Sai, Loveleen K. Brar (2005), Non-Contact Dynamic Mode Atomic Force Microscope : Effects of nonlinear atomic forces, I*EEE Transaction on Nanotechnology.*

2. **Soma Das**, P.A. Sreeram, Arup K. Raychaudhuri (2006),Effects of Nonlinear Forces on Dynamic Mode Atomic Force Microscopy and Spectroscopy,*Journal of Nanoscience and Technology.*

Talks given

Fundamental instability in static mode Automic Force Microscopy (AFM) and its impact on force distance curves, SNBFEST'06 at SNBNCBS, Kolkata , 24 March 2006.

Other academic/educational activities

i) Attended *NanoSingapore Conference* in Singapore, 10-13 January 2006.

ii) Attended *International Conference on Nanoscience and Technology (ICONSAT)* in Delhi, 15-18 March 2006.

Poster presentation

i) *Non-contact dynamic Mode Atomic Force microscope : Effects of nonlinear atomic forces,* NanoSingapore Conference, Singapore, 10-13 January 2006.

ii) *Fundamental instability in static mode Atomic Force Microscopy (AFM) and its impact on force distance curves,* ICONSAT, Delhi, 15-18 March 2006.

Tamoghna K. Das - *Jr. Research Fellow*

Supervisor: Dr. Surajit Sengupta

Other academic/educational activities

Visits, conferences, symposia

1. Attended *Computational Approach to Materials Science – 2006* (CAMS06), Jawaharlal Nehru Centre for Advanced Scientific Research, Jakkur, Banglore, 18 – 26 January 2006.
2. Visited Dr. Madan Rao, Associate Professor, Theoretical Condensed Matter Physics, Raman Research Institute, Banglore, 27 – 31 January 2006.

Debabrata Dutta- *Senior Research Fellow*

Supervisor: Prof. Jayanta Bhattacharjee
Co-Supervisor: Dr. Surajit Sengupta

Publications

i) Journals

Amitabha Nandi, **Debabrata Dutta**, Jayanta K. Bhattacharjee, Ramakrishna Ramaswamy (2005),The phase-modulated logistic map,*Chaos* 15, 023107.

Other academic/educational activities

i) Attended SERC School on Nonlinear Dynamics at PRL, Ahmedabad.

ii) Attended School on Advanced Statistical Physics at IISC, Bangalore.

Soumendu Datta - *Junior Research Fellow*

Supervisor : Dr. Tanusri Saha - Dasgupta

Publications

i) Journal

S. Datta, D. Chaudhuri, T. Saha-Dasgupta and S. Sengupta (2006), Electrical transport in deformed nanostrips : Electrical signature of reversible mechanical failure, *Europhys Lett.*, 73, 765.

Other academic/educational activities

i) Visits, conferences, symposia

Attended SERC school on Condensed Matter Physics, Saha Institute of Nuclear Physics, 2nd to 31st January 2006.

Attended INDO-US conference on novel and complex materials, Kolkata, 26-29 October 2005.

Sunandan Gangopadhyay – *Jr. Research Fellow*

Supervisor : Dr. Biswajit Chakraborty

Publications

i) Journals

1. Frederik G. Scholtz, Biswajit Chakraborty, **Sunandan Gangopadhyay**, Arindam Ghosh Hazra (2005), Dual Families of Non-commutative Quantum Systems, *Phys. Rev. D,* 71, 085005.
2. Biswajit Chakraborty, **Sunandan Gangopadhyay**, Arindam Ghosh Hazra, Frederik G. Scholtz (2005),Non(anti) commutativity for Open Superstrings, *Phys. Lett. B, 625*, 302-312.
3. Frederik G. Scholtz, Biswajit Chakraborty, **Sunandan Gangopadhyay**, Jan Govaerts (2005), Interactions in Noncommutativity in Quantum Hall systems, *Jour. Phys. A, 38*, 9849-9858.

Talks given

1. *Non(anti) commutativity for Open Superstrings* Institute of Mathematical Sciences, Chennai, 16 July 2005
2. Talk given for *Promotion to SRF:A review of the work done in the last two years,* SNBNCBS, 4 October 2005.
3. *Non(anti) commutativity for Open Superstrings,* International Conference on Noncommutativity and Quantum Physics, 8 January 2006.
4. *Non(anti) commutativity for Open Superstrings*,SNBNCBS, 24 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended *Workshop on Noncommutative Geometry and Quantum Physics,* Institute of Mathematical Sciences, Chennai, July-August 2005.
2. Attended *Amal Kumar Raychaudhuri School on General Relativity,* Saha Institute of Nuclear Physics, Kolkata 17-29 October 2005.
3. *International Conference on Noncommutative Geometry and Quantum Physics,* SNBNCBS , 4-10 January 2006.

Arindam Ghosh Hazra - *Jr. Research Fellow*

Supervisor : Dr. Biswajit Chakraborty

Publications

i) Journals

1. Frederik G. Scholtz, Biswajit Chakraborty, Sunandan Gangopadhyay, **Arindam Ghosh Hazra** (2005), Dual

Families of Non-commutative Quantum Systems, *Phys . Rev. D,* 71, 085005.

2. Biswajit Chakraborty, Sunandan Gangopadhyay, **Arindam Ghosh Hazra**, Frederik G. Scholtz (2005), Non(anti) commutativity for Open Superstrings, *Phys. Lett. B,* 625, 302-312.

Talks given

1. *Non(anti) commutativity for Open Superstrings,* Institute of Mathematical Sciences, Chennai, 16 July 2005.

2. *Non(anti) commutativity for Open Superstrings,* SNBNCBS, 4 October 2005.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended *Workshop on Noncommutative Geometry and Quantum Physics* ,Institute of Mathematical Sciences, Chennai, July-August 2005.
2. Attended *Amal Kumar Raychaudhuri School on General Relativity,* Saha Institute of Nuclear Physics, Kolkata, 17-29 October 2005.
3. Attended *International Conference on Noncommutative Geometry and Quantum Physics*, SNBNCBS, 4-10 January 2006.

ii) Poster presentation

Noncommutativity in Interpolating string: A study of gauge symmetries in noncommutative framework, Inhouse Meeting, SNBNCBS, March 2006

Mukul Kabir - *Sr. Research Fellow*

Supervisor : Prof. Abhijit Mookerjee

Publications

i) Journals

1. **Mukul Kabir**, D. G. Kanhere and Abhijit Mookerjee (2006), Large magnetic moments and anomalous exchange coupling in As-doped Mn clusters *Physical Review B* 73, 075210.
2. **Mukul Kabir**, Abhijit Mookerjee and D.G. Kanhere (2006), Structure, electronic properties and magnetic transition in manganese clusters *Physical Review B* (in press).

ii) Proceedings

Mukul Kabir, Abhijit Mookerjee and D. G. Kanhere (2005), Magnetism in pure and doped manganese clusters, *Lecture Series on Computer and Computational Sciences*, Vol-4, pp1018-1021 (Brill Academic Publishers, The Netherlands).

iii) Books

Mukul Kabir, Abhijit Mookerjee and D. G. Kanhere (2006), Magnetism inpure and doped manganese clusters *Atomic and Molecular Clusters: New Research* (Nova, New York)

Talks given

1. *Magnetic ordering in small magnetic clusters,* Uppsala University, Uppsala, Sweden, 20 April 2006.

2. *Emergence of noncollinear magnetic ordering in pure and As-doped manganese clusters*, International Conference of Computational Methods in Sciences and Engineering, Korinthos, Greece, 21-26 October 2005.

3. *Electronic and magnetic properties of pure and doped manganese clusters,* University of Saarland, Saarland, Germany, 19 October 2005.

Other academic activities

i) Visits, conferences, symposia

1. Visited the *Theoretical Magnetism* Group of Uppsala University, Uppsala, Sweden as a Guest Researcher, 15 March - 11 May 2006.

2. Attended and presented a lecture in the *SERC School on Condensed Matter Physics* , Saha Institute of Nuclear Physics, Kolkata, 2 – 31 January 2006.

3. Presented a poster in the *Indo-US Conference on Novel and Complex Materials,* SNBNCBS, 26 – 29 October 2005.

4. Attended the *International Conference* of *Computational Methods in Science and Engineering*, Korinthos, Greece, 21-26 October 2005.

5. Academic visit to the University of Saarland, Saarland, Germany during 18-20 October 2005.

M. Venkata Kamalakar – *Jr. Research Fellow*

Supervisor: Prof. Arup Kumar Raychaudhuri

Talks given

Study of Magnetic Nanowires at SNBOSEFET'06, SNBNCBS, 23 March 2006**.**

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended the *International Conference on NanoScience and Technology, ICONSAT 2006*, India Habitat Centre, New Delhi, 16 - 18 March 2006.

ii) Poster presentation

Study of Transport Properties of Magnetic Nanowires at the International Conference on NanoScience and Technology (ICONSAT2006), India Habitat Centre, New DelhI, 16-18 March 2006.

Awards/Honours received

The *Best Poster Award*, at the International Conference on NanoScience and Technology (ICONSAT2006), 16 - 18 March 2006, for presenting poster.

Hemant Kumar Kashyap- *Jr. Research Fellow*

Supervisor: Dr. Ranjit Biswas

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended conference on *Computational Approach in Material cience 06(CAMS06),*

JNCASR, Bangalore, 18 - 21 January 2006.

2. Attended *8th National Symposium in Chemistry (NSC08),* IIT Mumbai, Mumbai, 3 - 5 February 2006.

ii) Poster presentation

1. *Ionic Conductivity and Solvation Dynamics in Formamide* in *CAMS06*, JNCASR, Bangalore, 18- 21 January 2006.
2. *Twisted Intramolecular Charge Transfer Reactions in Electrolyte Solutions* in *NSC08*, IIT Mumbai, Mumbai,3-5 February 2006.
3. *Ionic Conductivity and Solvation Dynamics in Formamide* in *SNBFEST06*, SNBNCBS, 23 - 24 March 2006.

P. Anil Kumar – *Jr. Research Fellow*

Supervisor : Dr. Kalyan Mandal

Publications

i) Journals

K. Mandal, **S. Sinha** and P. Anil Kumar (2006), Contributions to giant magnetoimpedance from different domain regions of $Co_{68.15}Fe_{4.35}Si_{12.5}B_{15}$ amorphous wire, *J. Appl. Phys*., 99, 033901(1-5).

Talks given

1. *Structural and magnetic properties of Co nanoparticles in Cu/SiO_2 matrix,* National Conference on Condensed Matter and Material Physics, M S University of Baroda, Vadodara, 19-21 January 2006.
2. *Low temperature magnetization: Deviations from Blochs T3/2 law,* One day symposium on Nanoscience organized by UNANST, SNBNCBS, Kolkata, August 2006.

Other academic/educational activities

i) Visits, conferences, symposia

Attended Workshop on *The Applications of High Magnetic Field in Condensed Matter Science*, organized jointly by UGC-DAE, CSR, Kolkata and SNBNCBS Kolkata, 6 September 2005.

Subarna Mitra- *Sr. Research Fellow*

Supervisor: Dr. Kalyan Mandal

Publications

Proceedings

S. Mitra, and K. Mandal (2006), Superparamagnetic behavior in non-interacting $NiFe_2O_4$ nanoparticles grown in SiO_2 matrix, *International Conference on Advances in Materials and Materials Processings,* 432.

Talks given

1. *Superparamagnetic behavior in non-interacting $NiFe_2O_4$ nanoparticles grown in SiO_2 matrix*, Department of Metallurgical and Materials Engineering, Indian Institute of Technology, Kharagpur, 4 February 2006.
2. *Size and temperature dependent structural transitions in $NiFe_2O_4$ nanoparticles in SiO_2 matrix*, SNBOSEFEST '06, SNBNCBS, 23 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended *National Workshop on* Measurements and Characterization of *Magnetic Materials,* at Saha Institute of Nuclear Physics, Kolkata, 20-21 April 2006.
2. Attended seminar on *Recent Trends in Magnetism and Condensed Matter Physics*, Indian Association for the Cultivation of Science, Kolkata, 23 December 2005.
3. Attended *Workshop on the Applications of High Magnetic Field in Condensed Matter Science*, at UGC-DAE CSR, Kolkata centre, 6 September 2005.

Soumen Mondal - *Sr. Research Fellow*

Supervisor: Prof. Sandip K. Chakrabarti

Journals

Proceedings

1. Sandip K. Chakrabarti, **Soumen Mondal** (2005), A modified gravitational potential to study particals and fluids around a rotating black hole in the equatorial plane, *Indian J.Phys.*79(11), 1237-1241.
2. Sandip K. Chakrabarti, **Soumen Mondal** (2006), Studies of accretion flows around rotating black holes - I. Particle dynamics in a pseudo-Kerr potential, *2006, MNRAS.tmp. 508C.*

Talks given

Shock waves in accretion and wind around rotating black hole at SNBOSEFEST'06, 24 March 2006.

Other academic/educational activities

Visits, conferences, symposia

1. Attended *District-wise Space Science Symposium Maha-Biswa-O-Ami,* Balurghat and Siliguri, West Bengal, organized by Centre for Space Physics, Kolkata, 21 - 22 February 2006.
2. A regular visitor of Centre for Space Physics, Kolkata.

Anjan Kumar Nandi- *Senior Research Fellow*

Supervisor: Prof. Subhrangshu Sekhar Manna

Talks given

River *networks: An extension to scale-free networks* for SRF talk, SNBNCBS, 21 July 2005.

Other academic/educational activities

Poster presentation

Complex networks in Euclidean plane: From scale-free to river network, at In-House Meeting, SNBNCBS, Kolkata, 23-24 March 2005.

District-wise Space Science Symposium, Maha-Biswa-O-Ami, Balurghat and Siliguri, West Bengal, 21 - 22 February 2006.

Abhishek Pandey – *Jr. Research Fellow*

Supervisor : Prof. R. Ranganathan
Co-Supervisor: Prof. S. Dattagupta

Talks given

1. *Electronic, magnetic and transport properties of rare-earth based inter-metallic compounds*, Divisional review talk, Saha Institute of Nuclear Physics, Kolkata, 26 September 2005.

2. *Electronic, magnetic and transport properties of rare-earth based inter-metallic compounds*, JRF to SRF promotion talk at SNBNCBS, Kolkata, 4 October 2005.

3. *Electronic, magnetic and transport properties of rare-earth based inter-metallic perovskites,* SERC School, Saha Institute of Nuclear Physics, Kolkata, 13 January 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended *One day seminar on Material Physics* at Saha Institute of Nuclear Physics,Kolkata,19 September 2005.
2. Attended *SERC School on Condensed Matter Physics* at Saha Institute of Nuclear Physics, Kolkata, 3-31 January 2006.
3. Attended *Physics in the trails of Einstein* Saha Institute of Nuclear Physics, Kolkata, 21-22 November 2005.
4. Attended *Workshop on Measurement and characterization of Magnetic Materials* at Saha Institute of Nuclear Physics, Kolkata, 20-21 April 2006.

ii) Poster presentation

Magnetism and transport in rare-earth based inter-metallic perovskite compounds, SNBOSEFEST'06, SNBNCBS, Kolkata, during 23-25 March 2006.

Arya Paul - *Junior Research Fellow*

Supervisor : Dr. Surajit Sengupta

Other academic/educational activities

Visits, conferences, symposia

1. Attended *Computational Approach to Materials Science - 2006 (CAMS06)*, Jawaharlal Nehru Centre For Advanced Scientific Research, Jakkur, Bangalore, 18-26 January 2006.

2. Visited *Dr. Madan Rao, Associate Professor, Theoretical Condensed Matter Physics*, Raman Research Institute, Bangalore, 27-31 January 2006.

Tuhin Pradhan - *Senior Research Fellow*

Supervisor : Dr. Ranjit Biswas & Dr. Jaydeb Chakrabarti

Talks given

1. *Twisted Intra molecular Charge Transfer Reaction in Eletrolyte Solutions of Bulk system* in SNBFEST'06 at SNBNCBS, 23 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

Visited 9th National Symposium in Chemistry, IIT Bombay, 3-5 February 2006.

ii) Poster Presentation

Twisted Intra molecular Charge Transfer Reaction in Electrolyte Solutions at NSC8, IIT Bombay, 3-5 February 2006.

Badiur Rahaman – *Jr. Research Fellow*

Supervisor: Dr. Tanusri Saha Dasgupta

Talks given

i) DFT, LMTO and NMTO-downfolding technique, Condensed Matter Theory Group, Johann Wolfgang Goethe Universitat, Frankfurt Am Main, 11 September 2005.

ii) Cu-based organometallic system: an ab initio study, SNBNCBS, 31 October 2005.

Other academic/educational activities

i) Visits, conferences, symposia

1. Visited Johann Wolfgang Goethe Universitat, Frankfurt Am Main, September - October 2005
2. Attended *INDO-US Conference on Novel and Complex Materials*, SNBNCBS, 26-29 October 2005.
3. Attended *Discussion Meeting on Materials and Molecular Modelling,* IACS, 8-9 March 2006.

Santosh Roy- *Jr. Research Fellow*

Supervisor: Prof. Abhijit Mookerjee and Dr. Sukalyan Chattopadhyay

Publications

Proceedings

S. Roy, P. Datta, S. Chattopadhyay, S. Bhattacharya, T. K. Ghosh, S. Pal, H. C. Jain, P. K. Joshi, R. K. Bhowmik, R. Kumar, N. Madhavan, S. Muralithar, P. V. Madhusudhana Rao, R. P. Singh (2005), Prediction of magnetic bands in 108Ag through lifetime measurement, *DAE-BRNS 50th Symposium on Nuclear Physics*.

Talks given

1. *High Spin Behavior of neutron rich nuclei in mass -100 region,* at Inter University Accelerator Centre, New Delhi, 7 July 2005.

Other academic/educational activities

Visits, conferences, symposia

1. Attended *BRNS Sponsored Workshop on Changing Scale in Nuclear Physics,*VECC, Kolkata, 14-15 June 2005.
2. Attended *School on Nuclear Structure and Dynamics,* VECC (UGC-DAE Consortium for Scientific Research), 22-26 June 2005.
3. Attended *Beam Time Proposal BTR2,* Inter University Accelerator Centre, New Delhi, 6-7 July 2005.
4. Visited TIFR Mumbai for collaboration work with Dr. R. Palit (TIFR), during 30 October - 28 November 2005.
5. Attended *DAE-BRNS 50th Symposium on Nuclear Physics,* BARC Mumbai, 14-16 December 2005.

6. Attended *School-cum-Workshop on Low Energy Nuclear Astrophysics SLENA 2006*, SINP Kolkata, 16-20 January 2006.

7. Attended *SERC School on Nuclear Dynamics at Low and Medium Energies and Nuclear Structure*, VECC Kolkata, 13 March - 2 April 2006.

Poster presentation

1. *Prediction of magnetic bands in 108Ag through lifetime measurement Lifetime Measurement*, DAE-BRNS 50th Symposium on Nuclear Physics, BARC, December 2005.

2. *A study of Shears Mechanism in 104,106,108Ag*, SNBOSEFEST'06, March 2006.

Arnab Saha - *Jr. Research Fellow*

Supervisor: Prof. Jayanta Kumar Bhattacharjee
Co-Supervisor: Dr. Surajit Sengupta

Talks given

1. *Bondi flow in elliptical solar flare*, SNBNCBS, May 2005.

2. *Thermal ratchets in switching potential* at SNBNCBS, August 2005.

Other academic/educational activities

1. Completed Post-B.Sc. course work.

2. Attended *Course on Foundational Issues in Quantum Mechanics* by Prof. Jayanta Kumar Bhattacharjee at IACS- January 2006, three months duration.

3. Attended *Course on Statistical Mechanics* by Prof. Jayanta Kumar Bhattacharjee at SNBNCBS January 2006, four months duration.

Saurav Samanta- *Senior Research Fellow*

Supervisor: Dr. Rabin Banerjee

Publications

i) Journals

Saurav Samanta (2006), Noncommutativity from embedding techniques, *Mod. Phys. Lett.* A 21, 675-690.

Talks given

Noncommutativity in the Generalized Landau Problem , SNBNCBS, 4 October 2005.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended the *International Conference on Noncommutative Geometry and Quantum Physics*, SNBNCBS, 4-10 January 2006.

Poster presentation

Twisted Translation Symmetry in Snyder Space and Relativistic Particle Dynamics, Inhouse Meeting, SNBNCBS, March 2006.

Tapati Sarkar - *Jr. Research Fellow*

Supervisor:Prof. Arup Kumar Raychaudhuri

Talks given

Effect of size reduction on charge ordering in $La_{0.5}Ca_{0.5}MnO_3$, SNBOSEFET'06, SNBNCBS, 23 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

1. Attended *NanoSingapore2006: IEEE Conference on Emerging Technology – Nano Electronics*, Nanyang Technological University, Singapore, 10 – 13 January 2006.

2. Attended the *Indo-Japan Joint Seminar on Giant-Magnetoresistive Materials and their Electronic Structure*, Indian Institute of Science, Bangalore, 29 January-2 February 2006.

3. Attended the *International Conference on NanoScience and Technology (ICONSAT2006)*, India Habitat Centre, New Delhi , 16 - 18 March 2006.

ii) Poster presentation

1. *Effect of size reduction in* $La_{0.5}Ca_{0.5}MnO_3$ at the Indo-Japan Joint Seminar on Giant-Magnetoresistive Materials and their Electronic Structure, Indian Institute of Science, Bangalore, 29 January - 2 Feburary 2006.

2. *Effect of size reduction in* $La_{0.5}Ca_{0.5}MnO_3$ at the International Conference on NanoScience and Technology (ICONSAT 2006), India Habitat Centre, New Delhi, 16 - 18 March 2006.

Awards/Honours received

The *Best Presentation Award*, SNBNCBS, 23 March 2006, for talk given at SNBOSEFEST'06.

Ankush Sengupta – *Sr. Research Fellow*

Supervisors: Dr. Surajit Sengupta

Publications

i) Journals

A. Sengupta , S. Sengupta, G. I. Menon (2005), Probing disordered substrates by imaging the adsorbate in its fluid phase, *Europhys. Lett.*, 70, 635.

Talks given

1. *Crystalline and amorphous states of driven solids* at the Inhouse Meeting, SNBNCBS, 23 March 2006.

2. *Crystalline and amorphous states of driven solids* at the UNANST Group Seminar, SNBNCBS,15 February 2006.

3. *Crystalline and amorphous states of driven solids* at the Half a Day UNANST Meeting, SNBNCBS, 20 April 2006.

Other academic/educational activities

i) Visits, conferences, symposia

Attended *Tenth International Vortex State Studies Workshop (IVW10),* at TIFR, Mumbai, 9-14 January 2006.

ii) Poster presentation

Imaging inhomogeinity : Demistifying disorder at IVW10, TIFR, 9-14 January 2006.

Kartick Tarafder - *Senior Research Fellow*

Supervisor : Prof. Abhijit Mookherjee

Publications

i) Journals

1. **K. Tarafder** and A. Mookherjee (2005), Optical conductivity in disordered alloys : an approach via augumented space recursion, *J. Phys. : Condensed Matter*, 17, 6435.
2. **K. Tarafder**, Tapas Mitra and A. Mookherjee (2006), Electronic transmission in disordered system : a mode base formulation. *Physica B : Condensed Matter*, 371/1, 100.
3. **K. Tarafder**, K. K. Saha, A. Alam and A. Mookherjee (2006), Response function in disordered alloys : an approach via augumented space recursion, *J. Phys. : Conferences Series*, 29, 27.

ii) Proceedings

K. Tarafder, A. Chakraborti, K. K. Saha and A. Mookherjee (2006), Effect of Short-ranged Order on the electrical structure and optical properties of the CuZn alloy : an augment space approach.

Talks given

1. *Optical conductivity in disordered system : an approach via augment space recursion* at Surface Physics Division, Saha Institute for Nuclear Physics, Kolkata, 13 January 2006.
2. *Optical properties in disordered media*, at SNBNCBS, Kolkata, 20 April 2006.

Suman Sinha - *Sr. Research Fellow*

Supervisor: Dr. Kalyan Mandal

Publications

i) Journals

1. **S. Sinha** and K. Mandal (2005), Effect of tensile stress on the magnetic Barkhausen noise in amorphous $Fe_{70}Ni_8Si_{10}B_{12}$ ribbon, *Indian J. Phys.*, 79 (9), 991-993.
2. K. Mandal, **S. Sinha** and P. Anil Kumar (2006), Contributions to giant magnetoimpedance from different domain regions of $Co_{68.15}Fe_{4.35}Si_{12.5}B_{15}$ amorphous wire, *J. Appl. Phys.*, 99, 033901(1-5).
3. **S. Sinha** , K. Mandal and M.Vazquez (2006), Giant magnetoimpedance in amorphous $(Co_{0.93}Fe_{0.07})$ 63 $Ni_{10}Si_{11}B_{16}$ glass- coated microwire, *J. Magn. Magn. Mater.*, 302, 223-227.

Talks given

1. *Study of Magnetic Barkhausen noise from amorphous $Fe_{70}Ni_8Si_{10}B_{12}$ and $Fe_{40}Ni_{40}B_{20}$ ribbons*, at National Seminar on NDT & E (NDE- 2005), Science City, Kolkata, 2-4 December 2005.
2. *Magnetic Barkhausen noise study from amorphous ribbons*, at SNBOSEFEST '06 (Annual In- House Meeting), SNBNCBS, 23-24 March 2006.

Other academic/educational activities

i) Visits, conferences, symposia

Attended Workshop on *The Applications of High Magnetic Field in Condensed Matter Science*,organized jointly by UGC-DAE, CSR, Kolkata and SNBNCBS, at UGC-DAE, CSR, Kolkata, 6 September 2005.

ii) Poster Presentation

Study of Giant Magnetoimpedance of $Co_{68.15}Fe_{4.35}Si_{12.5}B_{15}$ *amorphous wire,* at Condensed Matter Days 2005,Gopalpur, Berhampur University, 29-31 August 2005.

Manoj Kumar Yadav - *Sr. Research Fellow*

Supervisors: Prof . Abhijit Mookerjee & Prof. Arup Kumar Raychaudhuri

Talks given

Phase function simulation for tissue phantom at SNBNCBS, 4 October 2005.

Other academic/educational activities

Visits, conferences, symposia

Attended *SERC School on Biophotonics,* Raja Rammna Centre for Advanced Technology, Indore, 6 -24 February 2006.

Faculty Publications

i) Journals

1. **Rabin Banerjee** and Kuldeep Kumar (2005), Seiberg-Witten maps and commutator anomalies in noncommutative electrodynamics, *Phys. Rev. D* 72, 85012.

2. **Rabin Banerjee,** Pradip Mukherjee and Anirban Saha (2005), Bosonic p-brane and ADM decomposition, *Phys. Rev. D* 72, 066015.

3. **Rabin Banerjee** and Shinichi Deguchi (2006), A BRST gauge fixing procedure for Yang-Mills theory on sphere, *Phys. Lett. B* 632, 579.

4. K. Dahl, **R. Biswas**, N. Ito and M. Marnoncelli (2005), Solvent dependence of the spectra and kinetics of excited-state charge transfer in three (Alkylamino) benzonitriles, *Journal of Physical Chemistry B*, 109, 1563.

5. C. Subramania, T. Pradeep and **J. Chakrabarti** (2005), Flow induced potential in nano-particle assemblies, *Physical Review Letter*, 95, 164501.

6. **J. Chakrabarti**, S. Chakrabarti and Lowentt (2006), Short ranged attraction and long ranged repulsion between two solute particles in a sub-critical liquid solvent, *JPCM (Letter)*, 18, 181.

7. Samir Mandal and **Sandip K. Chakrabarti** (2005), Signatures of accretion shocks in broadband spectrum of advective flows around black holes, *Intl. J. Mod. Phys. D,* 14, 933.

8. Sabyasachi Pal, **Sandip K. Chakrabarti**, K. Goswami, A. Nandi, B. G. Ananda Rao, S. Mondal (2005), Results of recent multi-wavelength campaign of SS433, *ChJAA*, 5, 69.

9. Samir Mandal and **Sandip K. Chakrabarti** (2005), Accretion shock signatures in the spectrum of two-temperature advective flows around black holes, *Astron. Astrophys.,* 434, 839.

10. **Sandip K. Chakrabarti** and S. Mondal (2005), A modified gravitational potential to study particles and fluids around a rotating black hole in the equatorial plane, *Ind. J. Phys*., 88 (11), 1237.

11. **Sandip K. Chakrabarti**, B.G. Anandarao, S. Pal, S. Mondal, A Nandi, A. Bhattacharyya, S. Mandal, R. Sagar, J.C. Pandey, A. Pati, and S.K. Saha (2005), SS 433: Results of a recent multi-wavelength campaign, *Mon. Not. R. Astron. Soc.,* 362, 957.

12. Anuj Nandi, **Sandip K. Chakrabarti**, T. Belloni and P. Goldoni (2005), X-ray observation of SS 433 with RXTE, *Mon. Not. R. Astron. Soc.,* 359,629.

13. **Sandip K. Chakrabarti**, M. Saha, R. Khan, S. Mandal, K. Acharyya, and R.Saha (2005), Possible detection of ionospheric disturbances during Sumatra-Andaman Islands earthquakes in December, *Ind. J. Radio and Space Phys.*, 34, 314.

14. **Sandip K. Chakrabarti** (2005), Numerical simulations reveal the origin of QPOs in black hole candidates, *ChJAA*, 5, 27.

15. **Sandip K. Chakrabarti**, Anuj Nandi, A. Chatterjee, A. Chowdhury, U. Chatterjee (2005), Class transitions and two component accretion flow in GRS 1915+105, *Astron. Astrophysics*, 431, 825.

16. K. Acharyya, **Sandip K. Chakrabarti**, S. Chakrabarti (2005), Molecular hydrogen formation during interstellar cloud collapse, *Mon. Not. R. Astron.Soc.*, 361, 550.

17. **Sandip K. Chakrabarti** (2005), Class transitions in black holes, *ChJAA*, 5, 33.

18. **Sandip K. Chakrabarti** (2005), A recent multi-wavelength campaign to observe the micro-quasar SS433, *Bull.Astron. Soc. India*, 33 (2), 109.

19. Sabyasachi Pal and **Sandip K. Chakrabarti** (2005), A GHz Flare in a quiescent black hole and a determination of the mass accretion rate, *ChJAA*, 5, 331.

20. **S.K. Chakrabarti,** A Nandi, D. Debnath, R. Sarkar and B.G. Dutta(2005), Propagating osciallatory Schok Model for QPOS in GROJ1655-40 druing the March 2005 out burst, *Ind .J. Phys. B*, 78, 1.

21. Sabyasachi Pal, **S. K. Chakrabarti**, A. Kraus and S. Mandal (2006), Broadband Radio Spectrum of SS433, *Bul. Astron. Soc. Ind.* 34, 1.

22. **Biswajit Chakraborty**, Sunandan Gangopadhyay, Arindam Ghosh Hazra, Frederik G. Scholtz (2005), Non (anti) commutativity for Open Superstrings,*Phys. Lett. B*, *625*, 302-312.

23. Frederik G. Scholtz, **Biswajit Chakraborty**, Sunandan Gangopadhyay, Jan Govaerts (2005), Interactions in Noncommutativity in Quantum Hall systems, *Jour. Phys. A*, *38*, 9849-9858.

24. Frederik G. Scholtz, **Biswajit Chakraborty**, Sunandan Gangopadhyay (2006), Dual Families of Non-commutative Quantum Systems, *Phys. Rev. D*, 71, 085005.

25. Jose Garcia - Palazios and **Sushanta Dattagupta** (2005), Spin Dynamics in a Dissipative Environment : from Quantal to Classical, *Physical Review Letter*, 95, 190401.

26. Malay Bandopadhyay and **Sushanta Dattagupta** (2006), Dissipative Landau Diamagnetism - A case study for Equilibrium and Nonequibrium Statistical Mechanics, *Journal of Statistical Physics*, 123, 1273.

27. Malay Bandopadhyay, **Sushanta Dattagupta** and Monami Sanyal (2006), Diffusion enhancement in a periodic potential under high-frequency space-dependent forcing, *Physical Reviw E*, 73, 051108.

28. **Debashis Gangopadhyay,** M.N. Sinha Roy (2006), Quantum Logic gates using q-deformed osciallators, *International Journal of Quantum Information*, 4, 1.

29. S. Banerjee and **G. Gangopadhyay** (2005), Laser cooling of vibrational degrees of freedom of a molecular system, *J. Chem. Phys.*, 123, 114304.

30. D. Rana and **G. Gangopadhyay** (2006), Theoretical studies of electron transfer through dendrimeric architecture, *J. Chem Phys*, 124.

31. **Partha Guha** (2005), Geodesic flows, Bihamiltonian structure and coupled KdV type systems, *Journal of Mathematical Analysis and Applications*, 310 no. 1, 45—56.

32. **Partha Guha** (2005), Euler-Poincare formalism of coupled KdV type systems and diffeomorphism group on S^1., *Journal of Applied Analysis* 11, 261-268.

33. **Partha Guha** (2005) Space of higher order differential operators on $S^1$and integrable flows, *International Journal of Geometric Methods in Modern Physics,* 2, 619-631.

34. **Partha Guha** (2006), Euler-Poincare flows and Leibniz structure of nonlinear reaction-diffusion and type systems, *Journal of Geometry and Physics* 56, no.9, 1736-1751.

35. **Partha Guha** and Peter J. Olver (2006), Geodesic flow and two (super) component analog of the Camassa—Holm Equation. *Symmetry, Integrability and Geometry: Methods and Applications (SIGMA)*, vol. 2, no. 54, pp 9.

36. **Partha Guha** (2006), Bidifferential calculi, bicomplex structure and its application to Bihamiltonian systems, *International Journal of Geometric Methods in Modern Physics* 3, 209-232.

37. **Amitabha Lahiri** (2005), Parallel transport on Non-Abelian Flux Tubes, *Modern Physics Letters*, A20, 1695.

38. Y.J. Zhao, **Priya Mahadevan** and Alex Zunger (2005), Practical rules for orbital-controlled ferromagnetism of 3d impurities in semiconductors, *Journal of Applied Physics,* 98, 113901.

39. S. Raj, D. Hashimoto, H. Matsui, S. Souma, T. Takahashi, S. Ray, A. Chakraborty, D.D. Sarma, **Priya Mahadevan**, W.H.McCarroll and M. Greenblatt (2005), Angle-esolved photoemission spectroscopy of the metallic sodium tungsten bronzes Na_xWO_3,*Phys. Rev. B,* 72, 125125.

40. **Priya Mahadevan** and S. Mahalakshmi (2006), Suitability of p-type conditions for ferromagnetism in GaN:Mn, *Phys. Rev. B,* 73, 153201**.**

41. S. Raj, D. Hashimoto, H. Matsui, S. Souma, T. Sato, T. Takahashi, D. D. Sarma, **Priya Mahadevan**, S. Oishi (2006), Angle resolved photoemission spectroscopy of the insulating Na_xWO_3: Anderson localization, polaron formation and remnant fermi surface, *Phys. Rev. Lett.,* 96, 147603.

42. K. Maiti, U. Manju, S. Ray, **Priya Mahadevan**, I.H. Inoue, C.Carbone and D.D. Sarma (2006),Understanding the bulk electronic structure of $CaSr_xVO_3$, *Phys. Rev B,* 73, 052508.

43. **A. S. Majumdar**, Nupur Mukherjee (2005),Braneworld black holes in cosmology and astrophysics, *Int. J. Mod. Phys. D,* 14, 1095.(*Invited Review Article*).

44. **A. S. Majumdar**, Nupur Mukherjee (2005),Gravitational lensing in the weak field limit by a braneworld black hole, *Mod. Phys. Lett.A,* 20, 2487.

45. Md. Manirul Ali, **A. S. Majumdar**, D. Home (2006), Quantum superarrivals: Bohr's wave particle duality revisited, *Found. Phys. Lett.*,19, 179.

46. S. Sinha and **K. Mandal** (2005), Effect of tensile stress on the magnetic Barkhausen noise in amorphous $Fe_{70}Ni_8Si_{10}B_{12}$ ribbon, *Indian J. Phys.*, 79 (9), 991-993.

47. **K. Mandal**, S. Sinha and P. Anil Kumar (2006), Contributions to giant magnetoimpedance from different domain regions of $Co_{68.15}Fe_{4.35}Si_{12.5}B_{15}$ amorphous wire, *J. Appl. Phys*., 99, 033901(1-5).

48. S. Sinha**, K. Mandal** and M. Vazquez (2006), Giant magnetoimpedance in amorphous $(Co_{0.93}Fe_{0.07})_{63}Ni_{10}Si_{11}B_{16}$ glass-coated microwire, *J. Magn. Magn. Mater*., 302**,** 223-227.

49. G. Mukherjee and **S. S. Manna** (2005), Phase transition in a directed traffic flow network, *Phys. Rev. E*. 71, 066108.

50. **Manu Mathur** and **Samir Kumar Paul** (2005), Coherent States with SU(2) and SU(3) Charges, *J. Phys. A,* 38, 7863.

51. **Manu Mathur** (2005), Harmonic Oscillator Prepotentials in SU(2) Lattice Gauge Theory, *J. Phys. A* 38, 10015.

52. **Anita Mehta**, J. M. Luck, J. M. Berg, and G.C. Barker (2005), Competition and cooperation: aspects of dynamics in sandpiles, *J. Phys. Cond. Mat,* 17, S2657.

53. **A. S. Majumdar, Anita Mehta** and J. M. Luck (2005), Interacting black holes on the brane: the seeding of binaries, *Physics Letters B*, 607, 219.

54. J.M. Luck and **Anita Mehta** (2005), A deterministic model of competitive cluster growth : glassy dynamics, metastability and pattern formation, *European Physics Journal B,* 44, 79.

55. G. Pari**, A. Mookerjee** and A.K Bhattacharya (2005), Investigation of the role of 3d-transition metal atoms (M = Ti-Ni) in a $Y_3Al_5O_{12}$ matrix by first principles electronic structure calculations., *Physica B : Condens Matter*, 358, 7.

56. Atisdipankar Chakrabarti and **A. Mookerjee** (2005), A self-consistent TB-LMTO-ASR method for the study of electronic structure of disordered binary alloys.**,** *E. Physical J B,* 44, 21.

57. Kamal K. Saha and **A. Mookerjee** (2005), Optical properties of random alloys: application to CuAu and NiPt, *J. Phys. Condens Matter,* 17, 4559-66.

58. G. Pari, **A. Mookerjee** and A.K Bhattacharya (2005), Investigation of the role of rare-earth atoms in a $Y_3Al_5O_{12}$ matrix by first principles electronic structure calculations, *Physica B:Condensed Matter*, 365, 163.

59. D. Paudyal and **A. Mookerjee** (2005), Phase stability in 3d-4d (CuAu) and segregation in 3d-5d (CuAg) alloys., *Physica B,* 366, 55.

60. T. Das, S. Deb and **A. Mookerjee** (2005), Study of the electronic and elasticproperties of transition metal and actinide carbides, *Physica B : Condensed Matter*, 367, 6.

61. K. Tarafder and **A. Mookerjee** (2005), Optical conductivity in disordered alloys : an approach via augmented space recursion, *J. Phys. Condens Matter*, 17, 6435.

62. A.Alam and **A. Mookerjee** (2005), Lattice thermal conductivity of disordered binary alloys, *Phys Rev B,* 72 , 214207 .

63. K. Tarafder, K.K. Saha, A. Alam and **A. Mookerjee** (2006), Response functions in

disordered alloys : an approach via the augmented space recursion, *J. Phys. Conf. Series*, 29, 27.

64. M. Kabir, **A. Mookerjee** and D. G. Kanhere(2006), Large magnetic moments and anomalous exchange coupling in As-doped Mn Clusters, *Phys Rev B*, 73, 075210.

65. A. Alam and **A. Mookerjee** (2006), Lattice thermal conductivity of disordered NiPd and NiPt alloys, *J. Phys. Condens Matter*, 18, 4589.

66. A. Chakrabarti, M. Chakraborty and **A. Mookerjee** (2006), Study of the one dimensional Holstein model using the augmented space approach, *Physica B : Condens Matter,* 368.

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Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

BUDGET SUMMARY 2005-2006

The funds come from the Department of Sciences and Technology, New Delhi. The following is the summary of the budget estimates for the year 2005-2006.

Figure in Lakhs (Rs.)

	Actuals 2004-2005	Budget Estimate 2005-2006	Revised Estimate 2005-2006
Non-Plan	70.39	74.24	* 74.55
Plan	902.43	1038.79	* 1085.86
TOTAL	**972.82**	**1113.03**	**1159.41**

* Sanctioned by DST Plan Rs. 1100 lakhs, Non-Plan Rs. 40 lakhs and released as under :

NON-PLAN

1.	Sanction Letter No. AI/SNB/004/2004 dated 11.04.2005	Rs.	8.33 lakhs
2.	Sanction Letter No. AI/SNB/004/2004 dated 11.07.2005	Rs.	31.67 lakhs
		Rs.	40.00 lakhs

PLAN

1.	Sanction Letter No. AI/SNB/003/2004 dated 11.04.2005	Rs.	183.33 lakhs
2.	Sanction Letter No. AI/SNB/003/2004 dated 11.07.2005	Rs.	806.67 lakhs
3.	Sanction Letter No. AI/SNB/003/2004 dated 09.03.2006	Rs.	110.00 lakhs
		Rs.	1100.00 lakhs

	TOTAL	**Rs.**	**1140.00 lakhs**

AUDITORS' REPORT TO THE GOVERNING BODY OF SATYENDRA NATH BOSE NATIONAL CENTRE FOR BASIC SCIENCES

We have audited the attached **BALANCE SHEET** of **Satyendra Nath Bose National Centre for Basic Sciences**, as at 31st March, 2006 and also the **INCOME AND EXPENDITURE ACCOUNT** for the year ended on that date annexed thereto. These financial statements are the responsibility of the Centre's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with auditing standards generally accepted in India. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

(i) We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit.

(ii) In our opinion, proper books of account as required by law have been kept by the Centre so far as appears from our examination of those books.

(iii) The Balance Sheet and the Income and Expenditure Account dealt with by this report are in agreement with the books of account.

(iv) In our opinion, the Balance Sheet and the Income and Expenditure Account dealt with by this report comply with the applicable accounting standards.

In our opinion and to the best of our information and according to the explanations given to us, the said accounts give a true and fair view in conformity with the accounting principles generally accepted in India in the case of the Balance Sheet, of the state of affairs of the Centre as at 31st March 2006; and in the case of the Income and Expenditure Account, of the surplus for the year ended on that date.

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner

Kolkata
Dated: 31/07/2006

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

BALANCE SHEET AS AT 31ST MARCH 2006

Amount in (Rs.)

	Schedule	Current Year	Previous Year
FUNDS AND LIABILITIES			
Corpus/Capital Fund	**1**	280008202.78	223029142.95
Reserves and Surplus	**2**	15564621.58	13547722.48
Earmarked/Endowment Funds	**3**	35473462.38	17580038.88
Secured Loans and Borrowings	**4**		
Unsecured Loans and Borrowings	**5**		
Deferred Credit Liabilities	**6**		
Current Liabilities and Provisions	**7**	8103395.88	5189016.84
Total		**339149682.62**	**259345921.15**
ASSETS			
Fixed Assets	**8**	206701562.91	155352169.08
Investments-from Earmarked/Endowment Funds	**9**	12046431.00	9300860.00
Investments - Others	**10**	28642737.00	33215970.00
Current Assets, Loans, Advances Etc.	**11**	91758951.71	61476922.07
Miscellaneous Expenditure			
(to the extent not written off or adjusted)			
TOTAL		**339149682.62**	**259345921.15**
Significant Accounting Policies	**24**		
Contingent Liabilities And Notes On Accounts	**25**		

Per our report of even date

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2006

Amount in (Rs.)

	Schedule	Current Year	Previous Year
INCOME			
Income from Sales/Services	**12**	571925.00	699246.25
Grants/Subsidies	**13**	48285898.00	45435342.00
Fees/Subscriptions	**14**		
Income from Investments (Income on Investment from earmarked/endowment Funds transferred to Funds)	**15**		
Income from Royalty, Publication etc.	**16**		
Interest Earned	**17**	3497441.00	1987893.00
Other Income	**18**	325128.50	352258.32
Increase/(decrease) in stock of finished goods and works-in-progress	**19**		
TOTAL (A)		**52680392.50**	**48474739.57**
EXPENDITURE			
Establishment Expenses	**20**	22933007.00	25896716.00
Other Administrative Expenses etc.	**21**	27732953.40	19339108.76
Expenditure on Grants, Subsidies etc.	**22**		
Interest	**23**		
Depreciation (Net total at the year-end-corresponding to Schedule 8)			
TOTAL (B)		**50665960.40**	**45235824.76**
Balance being excess of Income over Expenditure(A-B)		2014432.10	3238914.81
Prior period adjustments		2467.00	10763.00
Transfer to/from General Reserve			
BALANCE BEING SURPLUS/(DEFICIT) CARRIED TO GENERAL RESERVE		**2016899.10**	**3249677.81**
Significant Accounting Policies	**24**		
Contingent Liabilities and Notes on Accounts	**25**		

Per our report of even date

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31.03.2006

SCHEDULE 1
CORPUS/CAPITAL FUND:

Amount (Rs.)

	Current Year		Previous Year	
Balance as at the beginning of the year	223029142.95		228077573.00	
Less: Accumulated Depreciation upto 31-03-2004	—		35954736.05	
Add : Contributions towards Corpus/Capital Fund	54714102.00		39064658.00	
Less:Depreciation for the year(2005-06)	8735042.17		8158352.00	
Add : Grant-in-aid in transit	11000000.00	280008202.78	—	223029142.95
BALANCE AS AT THE YEAR - END		**280008202.78**		**223029142.95**

SCHEDULE 2
RESERVES AND SURPLUS:

Amount (Rs.)

	Current Year		Previous Year	
1. *Capital Reserve:*				
As per last Account				
Addition during the year				
Less: Deductions during the year				
2. *Revaluation Reserve:*				
As per last Account				
Addition during the year				
Less: Deductions during the year				
3. *Special Reserves:*				
As per last Account				
Addition during the year				
Less: Deductions during the year				
4. *General Reserve:*				
As per last Account	13547722.48		-25656691.38	
Add:Accumulated Depreciation upto 31-03-2004	—		35954736.05	
Add : Surplus during the year	2016899.10	15564621.58	3249677.81	13547722.48
TOTAL		**15564621.58**		**13547722.48**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31.03.2006

SCHEDULE 3
EARMARKED/ENDOWMENT FUNDS

Amount (Rs.)

	FUND-WISE BREAK UP				TOTAL	
	Project Fund	Medical Fund	Leave Salary Fund	Gratuity Fund	Current Year	Previous Year
a) Opening balance of the funds	5384599.88	149008.00	7355728.00	4690703.00	17580038.88	12107870.97
b) Additions to the funds						
i) Donations/grants/ contributions	41524308.00	95775.00			41620083.00	7562182.06
ii) Income from investments made on account of funds	706448.00		393069.00	253610.00	1353127.00	536508.00
iii) Other additions -Provision during the year			584349.00	809577.00	1393926.00	2129743.00
TOTAL (A + B)	**47615355.88**	**244783.00**	**8333146.00**	**5753890.00**	**61947174.88**	**22336304.03**
c) Utilisation/Expenditure towards objectives of funds						
i) Capital Expenditure						
Fixed Assets	19961037.00				19961037.00	1259384.50
Others						
Total						
ii) Revenue Expenditure						
Salaries, Wages and allowances etc.	3081474.00				3081474.00	2896311.00
Rent						
Other Administrative expenses	3431201.50				3431201.50	483166.65
Refund of Grant-in-aid against CSIR						117403.00
TOTAL (C)	**26473712.50**				**26473712.50**	**4756265.15**
NET BALANCE AS AT THE YEAR-END (a + b - c)	**21141643.38**	**244783.00**	**8333146.00**	**5753890.00**	**35473462.38**	**17580038.88**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31.03.2006

SCHEDULE 4
SECURED LOANS AND BORROWINGS:

Amount (Rs.)

		Current Year		Previous Year	
1.	Central Government				
2.	State Government (Specify)				
3.	Financial institutions				
	a) Term Loans				
	b) Interest accrued and due				
4.	Banks:				
	a) Term Loans				
	Interest accrued and due				
	b) Other Loans (Specify)				
	Interest accrued and due				
5.	Other Institutions and Agencies				
6.	Debentures and Bonds				
7.	Others (Specify)				
	TOTAL	**Nil**	**Nil**	**Nil**	**Nil**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31.03.2006

SCHEDULE 5
UNSECURED LOANS AND BORROWINGS

Amount (Rs.)

	Current Year		Previous Year	
1. Central Government				
2. State Government (Specify)				
3. Financial Institutions				
4. Banks:				
a) Term Loans				
b) Other Loans (Specify)				
5. Other Institutions and Agencies				
6. Debentures and Bonds				
7. Fixed Deposits				
8. Others (Specify)				
TOTAL	**Nil**	**Nil**	**Nil**	**Nil**

SCHEDULE 6
DEFERRED CREDIT LIABIILTIES

Amount (Rs.)

	Current Year		Previous Year	
a) Acceptances secured by hypothecation of capital equipment and other assets				
b) Others				
TOTAL	**Nil**	**Nil**	**Nil**	**Nil**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31.03.2006

SCHEDULE 7
CURRENT LIABILITIES AND PROVISIONS

Amount (Rs.)

		Current Year	Previous Year
A.	**CURRENT LIABILITIES**		
1.	Acceptances		
2.	Sundry Creditors:		
	a) For Capital expenditure (including Project Rs.30000)	3283744.00	1951041.00
	b) Others - Revenue expenditure (including Project Rs.11660)	2141277.00	1733764.00
3.	Advances Received		
4.	Interest accrued but not due on:		
	a) Secured Loans/borrowings		
	b) Unsecured Loans/borrowings		
5.	Statutory Liabilities:		
	a) Overdue		
	b) Others		
6.	Other Current Liabilities	2611175.88	1434545.84
	TOTAL (A)	**8036196.88**	**5119350.84**
B.	**PROVISIONS**		
1.	For Taxation		
2.	Gratuity		
3.	Superannuation/Pension		
4.	Accumulated Leave Encashment		
5.	Trade Warranties/Claims		
6.	Others - Adhoc Bonus	67199.00	69666.00
	TOTAL (B)	**67199.00**	**69666.00**
	TOTAL (A + B)	**8103395.88**	**5189016.84**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31.03.2006

SCHEDULE 8
FIXED ASSETS

Amount (Rs.)

DESCRIPTION	GROSS BLOCK				DEPRECIATION				NET BLOCK	
	Cost/valuation as at begining of the year	Additions during the year	Deductions during the year	Cost/valuation at the year-end	As at the beginning of the year	Additions during the year	Deductions during the year	Total up to the year-end	Current year-end	Previous year-end
A. FIXED ASSETS:										
1. Land:										
a) Freehold										
b) Leasehold	10950694.00			10950694.00					10950694.00	10950694.00
2. Buildings:										
a) On Freehold Land										
b) On Leasehold Land	81140223.07	678601.00		81818824.07	10330962.14	1328087.00		11659049.14	70159774.93	70809260.93
c) Ownership Flats/Premises										
d) Superstructures on Land not belonging to the entity										
3. Plant Machinery & Equipments	8903788.50	29343878.00		38247666.50	934020.46	563989.00		1498009.46	36749657.04	7969768.04
4. Vehicles	363026.00			363026.00	272945.74	34487.00		307432.74	55593.26	90080.26
5. Furniture, Fixtures	12817762.80	779540.00		13597302.80	6664830.13	1235913.00		7900743.13	5696559.67	6152932.67
6. Office Equipments	1148234.70	300167.00		1448401.70	427711.66	56930.00		484641.66	963760.04	720523.04
7. Computer/Peripherals	21526849.90	2043630.00		23570479.90	17209303.21	2886943.00	231758.83	19864487.38	3705992.52	4317546.69
8. Electric Installations	1744882.00			1744882.00	432027.79	82882.00		514909.79	1229972.21	1312854.21
9. Library Books	54164490.61	17114940.00		71279430.61	7834245.76	2773569.00		10607814.76	60671615.85	46330244.85
10. Tubewells & W.supply										
11. Other Fixed Assets	84225.55			84225.55	7041.16	4001.00		11042.16	73183.39	77184.39
TOTAL OF CURRENT YEAR	**192844177.13**	**50260756.00**		**243104933.13**	**44113088.05**	**8966801.00**	**231758.83**	**52848130.22**	**190256802.91**	**148731089.08**
PREVIOUS YEAR	**172334063.26**	**27138133.00**	**6939.13**	**192844177.13**	**35954736.05**	**8158352.00**		**44113088.05**	**148731089.08**	**136379327.21**
B. CAPITAL WORK IN PROGRESS		16444760.00							16444760.00	6621080.00
TOTAL	**192844177.13**	**66705516.00**		**243104933.13**	**44113088.05**	**8966801.00**	**231758.83**	**52848130.22**	**206701562.91**	**155352169.08**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
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S P MUKHERJEE
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Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31.03.2006

SCHEDULE 9
INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS

Amount (Rs.)

		Current Year	Previous Year
1.	In Government Securities		
2.	Other approved Securities		
3.	Shares		
4.	Debentures and Bonds		
5.	Subsidiaries and Joint Ventures		
6.	Others - Fixed Deposit with Nationalised Banks	12046431.00	9300860.00
	TOTAL	**12046431.00**	**9300860.00**

SCHEDULE 10
INVESTMENTS - OTHERS

Amount (Rs.)

		Current Year	Previous Year
1.	In Government Securities		
2.	Other approved Securities		
3.	Shares		
4.	Debentures and Bonds		
5.	Subsidiaries and Joint Ventures		
6.	Others - Fixed Deposit with Nationalised Banks	28642737.00	33215970.00
	TOTAL	**28642737.00**	**33215970.00**

Kolkata
Dated : 31/07/2006

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S P MUKHERJEE
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Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31.03.2006

SCHEDULE 11
CURRENT ASSETS, LOANS, ADVANCES ETC.

(Amount Rs.)

		Current Year	Previous Year
A.	**CURRENT ASSETS:**		
1.	**Inventories:**		
	a) Stores and Spares	258930.00	293397.38
	b) Loose Tools		
	c) Stock-in-trade		
	Finished Goods		
	Work-in-progress		
	Raw Materials		
	Stock of Books		
2.	**Sundry Debtors:**		
	a) Debts Outstanding for a period exceeding six months		
	b) Others		4702.00
3.	**Cash balances in hand** (includnig cheques/drafts and imprest)	27232.85	3752.10
4.	**Bank Balances:**		
	a) *With Scheduled Banks:*		
	On Current Accounts(including Project A/C)	11703212.86	12786106.59
	On Deposit Accounts (includes margin money-LC& BG)	3501592.00	1222992.00
	On Savings Accounts	14717764.00	
	b) *With non-Scheduled Banks:*		
	On Current Accounts		
	On Deposit Accounts		
	On Savings Accounts		
5.	**Remittance - in - Transit**	11000000.00	
6.	**Post Office-Savings Accounts**		
TOTAL (A)		**41208731.71**	**14310950.07**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
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S P MUKHERJEE
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Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31.03.2006

SCHEDULE 11
CURRENT ASSETS, LOANS, ADVANCES ETC. (Contd.)

Amount (Rs.)

		Current Year	Previous Year
B.	**LOANS, ADVACNES AND OTHER ASSETS**		
1.	**Loans:**		
	a) Staff including HBA,Vehicle & PC Advance	3086286.00	3486220.00
	b) Other Entitites engaged in activities/objectives similar to that of the Entity		
	c) Other - Project A/c	73019.00	320739.00
2.	**Advances and other amounts recoverable in cash or in kind or for value to be received:**		
	a) On Capital Account - CPWD Deposit Account	45826017.00	42449697.00
	b) Prepayments		
	c) Others (Security Deposits)	92218.00	92218.00
	d) Contractors & Suppliers	162724.00	17941.00
3.	**Income Accrued:**		
	a) On Investments from Earmarked/Endowment Funds	1241579.00	594900.00
	b) On investmetns - Others	68377.00	144257.00
	c) On Loans and Advances		
	d) Others (includes income due unrealised - Rs.....)		
4.	**Claims Receivable - Grant -in- Aid Receivable**	—	60000.00
	TOTAL (B)	**50550220.00**	**47165972.00**
	TOTAL (A + B)	**91758951.71**	**61476922.07**

Kolkata
Dated : 31/07/2006

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31.03.2006

SCHEDULE 12
INCOME FROM SALES/SERVICES

Amount (Rs.)

		Current Year	Previous Year
1.	**Income from Sales**		
	a) Sale of Finished Goods		
	b) Sale of Raw Material		
	c) Sale of Scraps		
2.	**Income from Services**		
	a) Labour and Processing Charges		
	b) Professional/Consultancy Services		
	c) Agency Commission and Brokerage		
	d) Maintenance Services (Equipment/Property)		
	e) Others - Guest House	571925.00	699246.25
	TOTAL	**571925.00**	**699246.25**

SCHEDULE 13
GRANTS/SUBSIDIES
(Irrevocable Grants & Subsidies Received)

Amount (Rs.)

		Current Year	Previous Year
1.	Central Government	48285898.00	45435342.00
2.	State Government(s)		
3.	Government Agencies		
4.	Institutions/Welfare Bodies		
5.	International Organsations		
6.	Others		
	TOTAL	**48285898.00**	**45435342.00**

Kolkata
Dated : 31/07/2006

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S P MUKHERJEE
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Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31.03.2006

SCHEDULE 14
FEES/SUBSCRIPTIONS

Amount (Rs.)

		Current Year	Previous Year
1)	Entrance Fees		
2)	Annual Fees/Subscriptions		
3)	Seminar/Program Fees		
4)	Consultancy Fees		
5)	Others		
	TOTAL	**Nil**	**Nil**

Note: Accounting Policies towards each item are to be disclosed

SCHEDULE 15
INCOME FROM INVESTMENTS
(Income on Investment from Earmarked/Endowment Funds transferred to Funds)

Amount (Rs.)

		Investment from Earmarked Fund		Investment - Others	
		Current Year	Previous Year	Currnet Year	Previous Year
1.	Interest				
	a) On Govt. Securities				
	b) Other Bonds/Debentures				
2.	Dividents				
	a) On Shares				
	b) On Mutual Fund Securities				
3.	Rents				
4.	Others				
	TOTAL	**Nil**	**Nil**	**Nil**	**Nil**
	TRANSFERRED TO EARMARKED/ ENDOWMENT FUNDS	**Nil**	**Nil**	**Nil**	**Nil**

Kolkata
Dated : 31/07/2006

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31.03.2006

SCHEDULE 16
INCOME FROM ROYALTY, PUBLICATION ETC.

Amount (Rs.)

		Current Year	Previous Year
1.	Income from Royalty		
2.	Income from Publications		
3.	Others		
	TOTAL	**Nil**	**Nil**

SCHEDULE 17
INTEREST EARNED

Amount (Rs.)

		Current Year	Previous Year
1.	On Term Deposits:		
	a) With Scheduled Banks	3497441.00	1987893.00
	b) With Non-Scheduled Banks		
	c) With Institutions		
	d) Others		
2.	On Savings Accounts:		
	a) With Scheduled Banks		
	b) With Non-Scheduled Banks		
	c) Post Office Savings Accounts		
	d) Others		
3.	On Loans:		
	a) Employees/Staff		
	b) Others		
4.	Interest on Debtors and Other Receivables		
	TOTAL	**3497441.00**	**1987893.00**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
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Sd/-
S P MUKHERJEE
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Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31.03.2006

SCHEDULE 18
OTHER INCOME

Amount (Rs.)

		Current Year	Previous Year
1.	Profit on sale/disposal of assets:		
	a) Owned assets		
	b) Assets acquired out of grants, or received free of cost		
2.	Export Incentives realized		
3.	Fees for Miscellaneous Services		
4.	Miscellaneous Income	325128.50	352258.32
	TOTAL	**325128.50**	**352258.32**

SCHEDULE 19
INCREASE/(DECREASE) IN STOCK OF FINISHED GOODS & WORK IN PROGRESS

Amount (Rs.)

		Current Year	Previous Year
a)	Closing stock		
	Finished Goods		
	Work-in-progress		
b)	Less:Opening Stock		
	Finished Goods		
	Work-in-progress		
	NET INCREASE/(DECREASE) (a-b)	**Nil**	**Nil**

SCHEDULE 20
ESTABLISHMENT EXPENSES

Amount (Rs.)

		Current Year	Previous Year
a)	Salaries and Wages	19121834.00	20594022.00
b)	Allowances and Bonus	75586.00	82256.00
c)	Contribution to Provident Fund	1131339.00	1173048.00
d)	Contribution to Other Fund - Gratuity Fund & Leave Salary Fund	1393926.00	2129743.00
e)	Staff Welfare Expenses (Medical)	701206.00	1224467.00
f)	Expenses on Employees' Retirement and Terminal Benefits		
g)	Others	509116.00	693180.00
	TOTAL	**22933007.00**	**25896716.00**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
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Sd/-
S P MUKHERJEE
Partner

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31.03.2005

SCHEDULE 21
OTHER ADMINISTRATIVE EXPENSES ETC.

Amount (Rs.)

		Current Year	Previous Year
a)	Visiting Scientist - Professors	530733.00	631441.00
b)	Academic Staff Research Expenses	3500.00	46456.00
c	Library General Expenses	78786.00	78677.00
d	Electricity and Power	3620354.20	3197001.00
e)	Laboratory Expenses	1079349.00	
f)	Insurance	7311.00	7565.00
g)	Repairs and Maintenance	7043433.88	5949243.09
h)	Excise Duty		
i)	Rent, Rates and Taxes	136514.00	276804.00
j)	Vehicles Running and Maintenance including hire charges	1347685.00	854618.00
k)	Postage, Telephone and Communication Charges	1450516.75	971775.00
l)	Printing and Stationary	331998.00	281816.00
m)	Travelling and Conveyance Expenses including TPSC	1348049.50	1270079.50
n)	Expenses on Seminars/Workshops	1026701.00	1782147.00
o)	Subscription Expenses		
p)	Expenses on Fees		
q)	Auditors' Remuneration	18000.00	18734.00
r)	Hospitality Expenses	512.00	7501.00
s)	Professional Charges (Contract Services & Legal Charges etc.)	703983.00	997745.00
t)	Provision for Bad and Doubtful Debts/Advances		
u)	Irrecoverable Balances Written-off		
v)	Integrated Ph.D. and Education Programme	6024863.00	2077896.04
w)	Import Clearing Expenses including Custom Duty	1295043.78	171309.00
x)	Distribution of Books		
y)	Advertisement and Publicity	591563.00	141120.00
z)	Others	1094057.29	577181.13
	TOTAL	**27732953.40**	**19339108.76**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31.03.2006

SCHEDULE 22
EXPENDITURE ON GRANTS, SUBSIDIES ETC.

Amount (Rs.)

		Current Year	Previous Year
a)	Grants given to Institutions/Organisations		
b)	Subsidies given to Institutions/Organisations		
	TOTAL	**Nil**	**Nil**

SCHEDULE 23
INTEREST

Amount (Rs.)

		Current Year	Previous Year
a)	On Fixed Loans		
b)	On Other Loans (Including Bank Charges)		
c)	Others (specify)		
	TOTAL	**Nil**	**Nil**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner

Satyendra Nath Bose National Centre for Basic Sciences
Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULE 24

SIGNIFICANT ACCOUNTING POLICIES

1. ACCOUNTING CONVENTION

The financial statements are prepared on the basis of historical cost convention, unless otherwise stated and on the accrual method of accounting. Interest on housing and conveyance loans granted are accounted on cash basis. Grants from Govt. of India is accounted on cash basis .

2. INVENTORY VALUATION

Stores and Spares (including machinery spares) are valued at cost.

3. INVESTMENTS

Investments are valued at cost.

4. FIXED ASSETS

Fixed assets are stated at cost of acquisition inclusive of inward freight, duties and taxes and incidental and direct expenses related to acquisition, if material.

Fixed Assets received by way of non-monetary grants (other than towards the Corpus Fund), are capitalized at value stated / agreed by corresponding credit to Capital Fund. Incomplete work is shown as Capital-Work- in Progress to be capitalized on completion.

Library Books are accounted for on receipt basis and Journals are accounted for on payment basis.

5. DEPRECIATION

5.1 Depreciation is provided on straight-line method as per rates specified in the Companies Act, 1956.

5.2 In respect of additions to / deletion from fixed assets during the year, depreciation is considered on pro-rata basis.

5.3 Depreciation arising on Fixed Assets is deducted from Fixed Assets and also from corpus fund out of which Fixed Assets are created.

6. GOVERNMENT GRANTS/SUBSIDIES

6.1 Government grants of the nature of contribution towards capital costs of setting up projects are treated as Capital Reserve.

7. FOREIGN CURRENCY TRANSACTIONS

Transactions denominated in foreign currency are accounted at the exchange rate prevailing at the date of transaction.

8. RETIREMENT BENEFITS

Liability towards gratuity payable on death/retirement of employees is computed on the assumption that employees are entitled to receive the benefit as at each year end.

Provision for accumulated leave encashment benefit to the employees is accrued and computed on the assumption that employees are entitled to receive the benefit as at each year end.

Liabilities under above accounts are invested separately in fixed deposit accounts with nationalized bank.s under above accounts are invested separately in fixed deposit accounts with nationalized bank.

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
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Sd/-
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Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULE 25

CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS

1. CONTINGENT LIABILITIES

1.1 Claims against the Centre not acknowledged as debts – Rs. Nil (Previous year Rs.Nil).

1.2 In respect of

- Bank guarantees given by/on behalf of the Centre – Rs.28,08,092.00 against 100% margin money by way of fixed deposit (Previous year Rs.9,85,092.00).
- Letters of Credit opened by Bank on behalf of the Centre – Rs. 6,93,500.00 (Previous year Rs.2,34,900.00) against 100% margin money by way of fixed deposit .
- Bills discounted with banks – Rs. Nil (Previous year Rs.Nil).

1.3 Disputed demands in respect of:

Income-tax	Rs. Nil (Previous year Rs.Nil)
Sales-tax	Rs. Nil (Previous year Rs.Nil)
Municipal Tax	Rs. Nil (Previous year Rs.Nil)

1.4 In respect of claims from parties for non-execution of orders, but contested by the Centre – Rs. Nil (Previous year Rs.Nil).

2. NOTES ON ACCOUNTS

2.1.1 Capital Commitments:

Estimated value of contracts remaining to be executed on capital account and not provided for Rs. 1.78 Crores (Previous year Rs.5.99 Crores).

2.2.1. Rs. 8735042.17 being depreciation on Fixed Assets for the year was not passed through Income & Expenditure Account and instead directly debited to Corpus Fund in terms of accounting policy clause 5.3 of Schedule 24.

2.2.2 Value of capital work-in progress as on 31-03-2006 Rs. 1,64,44,760.00 (previous year –Rs. 66,21,080.00) of which Rs. 1,62,36,111.00 (previous year Rs. 6412431.00) has been taken in accounts on the basis of certificate given by C.P.W.D who is carrying out the work on 'deposit' basis.

2.2.3 Current Assets, Loans and Advances

In the opinion of the Management, the current assets, loans and advances have a value on realization in the ordinary course of business, equal at least to the aggregate amount shown in the Balance Sheet.

Kolkata
Dated : 31/07/2006

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Block JD, Sector-III, Salt Lake, Kolkata - 700 098

SCHEDULE 25 (Contd.)

2.3 Taxation

In view of there being no taxable income under Income-tax Act 1961, no provision for Income tax has been considered necessary.

2.4 Foreign Currency Transactions

i) Expenditure in foreign currency:

a) Travel : Nil

b) Remittances and Interest payment to Financial Institutions/Banks in Foreign Currency : Nil

c) Other expenditure: Nil

- Commission on Sales
- Legal and Professional Expenses
- Miscellaneous Expenses
- Bank Charges

ii) Earnings:

Value of Exports on FOB basis: Nil

2.5 Physical Verification of Fixed Assets was conducted at the year end. Adjustments for discarded assets will be made after reconciliation with fixed assets register.

2.6 Transfer of Fixed Assets from project to general fund upon completion of project has not been done pending approval from DST,Govt. of India.

2.7 In absence of any specific directions from Appropriate Authority contributions to Medical Fund Rs.2,44,783.00 (previous year Rs. 1,49,008.00) by the employees are appearing under Earmarked & Endowment Fund as on 31-03-2006.

2.8 An amount of Rs. 8250.00 is payable to P.F. Account appearing under Current Liabilities (previous year Rs. 5,64,773.00).

2.9 Corresponding figures for the previous year have been regrouped/rearranged, wherever necessary.

Kolkata
Dated : 31/07/2006

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Block JD, Sector-III, Salt Lake, Kolkata - 700 098

RECEIPTS AND PAYMENTS ACCOUNTS
For The Year Ended 31st March 2006

	RECEIPTS	Current Year	Previous Year
I.	**Opening Balances**		
	a) Cash in hand	3752.10	4198.10
	b) Bank Balances :		
	i. In current accounts	12786106.59	3666936.85
	ii. In deposit accounts	33215970.00	29106686.00
	iii. Savings accounts		
II.	**Grants Received**		
	a) From Government of India		
	-For the year	155615715.00	91946704.06
	-For the previous year		7000000.00
	b) From State Government		
	c) From other sources (details) (Grants for capital & revenue exp. To be shown separately)		
III.	**Income on Investments from**		
	a) Earmarked/Endow Funds		
	b) Own Funds (Oth. Investment)	2407139.00	1388143.00
IV.	**Interest Received**		
	a) On Bank deposits	1872630.00	433820.00
V.	**Other Income**	797820.75	805206.25
VI.	**Amount Borrowed**		
VII.	**Any other receipts**	2533094.00	1582734.12
VIII.	**Amount transferred to Current Account from Deposit Account**	6980372.00	10987926.00
		216212599.44	**146922354.38**

	PAYMENTS	Current Year	Previous Year
I.	**Expenses :**		
	a) Establishment Expenses	20360144.00	25815878.00
	b) Administrative Expenses	30975572.73	17450496.15
II.	**Payments made against funds for various Projects**		
III.	**Investments and deposits made**		
	a) Out of Earmarked/Endowment funds	9725943.00	12149313.00
	b) CPWD Deposit	13200000.00	18862128.00
	c) Bank Gurantee & LC A/C	3108844.00	
IV.	**Expenditure on Fixed Assets & Capital Work-in-Progress**		
	a) Purchase of Fixed Assets	62406423.00	20173333.50
	b) Expenditure on Capital Work-in-Progress		
V.	**Refund of surplus money/loans**		
	a) To the Government of India		
	b) To the State Government		
	c) To other providers of funds		
VI.	**Finance Charges (Interest)**		
VII.	**Other Payments**	6843134.00	6465377.04
VIII.	**Closing Balances**		
	a) Cash in hand	27232.85	3752.10
	b) Bank Balances :		
	i. In current accounts	11703212.86	12786106.59
	ii. In deposit accounts	32144329.00	33215970.00
	iii. Savings accounts	14717764.00	
	iv. Remittance-in-Transit	11000000.00	
		216212599.44	**146922354.38**

Kolkata
Dated : 31/07/2006

For MOOKHERJEE BISWAS & PATHAK
Chartered Accountants
Sd/-
S P MUKHERJEE
Partner