

वार्षिक प्रतिवेदन  
ANNUAL REPORT  
2002 - 2003



सत्येन्द्र नाथ बसु राष्ट्रीय मौलिक विज्ञान केन्द्र  
SATYENDRA NATH BOSE NATIONAL CENTRE FOR BASIC SCIENCES

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**ANNUAL REPORT**

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

BLOCK JD, SECTOR III, SALT LAKE, KOLKATA 700 098

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सत्येन्द्र नाथ बसु राष्ट्रीय मौलिक विज्ञान केन्द्र  
Satyendra Nath Bose National Centre for Basic Sciences

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English  
PART-A

## Foreword

It is a pleasure to state that the Centre has witnessed an all round progress during the last six years. The research productivity of the faculty and students has considerably increased and there has been further improvement in library and computational facilities. We can now boast of one of the finest collections of books at our library. I am also happy to write that the number of research students has increased almost ten-fold in the last four years. Details below some of the activities of the Centre:

Dr. S. N. Bose, Member of the Indian Parliament, delivered a very well-attended lecture on the contemporary interesting topic of *India Today* on 4 July 2003. Gen. Roy Chowdhury also inaugurated an Archive, dedicated to the memory of Prof. S. N. Bose.

- i) Prof. M. S. Raghunathan from the Tata Institute of Fundamental Research spoke on *India's Exports and India Today* on 11 July 2003. Prof. Raghunathan is a

# English PART-A

Dr. S. N. Bose, Member of the Indian Parliament, delivered a very well-attended lecture on the contemporary interesting topic of *India Today* on 4 July 2003. Gen. Roy Chowdhury also inaugurated an Archive, dedicated to the memory of Prof. S. N. Bose.

Prof. B. Srinivasan, Member of the Indian Parliament, delivered a very well-attended lecture on the contemporary interesting topic of *India Today* on 4 July 2003. Gen. Roy Chowdhury also inaugurated an Archive, dedicated to the memory of Prof. S. N. Bose.

Satyendra Nath Bose

Prof. C. N. R. Rao, Lazarus Pauling Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, addressed around 1000 school children from different schools in Kolkata at the Science City Auditorium on 9 January 2005. His lecture on *Celebration of Chemistry* and the presentation on *Learning Chemistry* was organised by the Centre.

The Centre also organised the following programmes:  
i) A seminar on *India Today* by Sankar Roy Chowdhury, Member of the Upper House of the

Indian Parliament, delivered a very well-attended lecture on the contemporary interesting topic of *India Today* on 4 July 2003. Gen. Roy Chowdhury also inaugurated an Archive, dedicated to the memory of Prof. S. N. Bose.

Prof. B. Srinivasan, Member of the Indian Parliament, delivered a very well-attended lecture on the contemporary interesting topic of *India Today* on 4 July 2003. Gen. Roy Chowdhury also inaugurated an Archive, dedicated to the memory of Prof. S. N. Bose.

## Foreword

It is a pleasure to state that the Centre has maintained its all round progress during the last one year. The research productivity of the faculty and students has considerably increased and there has been further improvement in library and computational facilities. We can now boast of one of the finest collections of books at our library. I am also happy to write that the number of research students has increased almost ten-fold in the last four years. I mention below some of the other highlights.

The 13th S. N. Bose Memorial Lecture was delivered by Professor J. V. Narlikar, Director & Homi Bhabha Professor, Inter-University Centre for Astronomy and Astrophysics, Pune on 11 November 2002. Prof. Narlikar spoke on *Facts and Speculations in Cosmology*. The lecture reviewed the progress of cosmology over the ages to the present times.

Professor B. Sriram Shastry, Indian Institute of Science, Bangalore delivered the 2nd C. K. Majumdar Memorial Lecture on 1 January 2003 on *Dynamical Symmetries, Accidental Degeneracies and Transport in Many Body Systems*. The lecture was dedicated to the memory of our Founder-Director Prof. C. K. Majumdar. It also coincided with the birth anniversary of Prof. Satyendra Nath Bose.

Prof. C. N. R. Rao, Linus Pauling Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, addressed around 2000 school children from different schools in Kolkata at the Science City Auditorium on 9 January 2003. His lecture on *Celebration of Chemistry* and the presentation on *Learning Chemistry* was organised by the Centre.

The Centre also organised the following special lectures :

i) Gen.(retd.) Sankar Roy Chowdhury, Member of the Upper House of the

Parliament, delivered a very well-attended lecture on the contemporarily interesting topic of *India Today* on 4 July 2002. Gen. Roy Chowdhury also inaugurated an Archive, dedicated to the memories of Prof. S. N. Bose.

ii) Prof. M. S. Raghunathan from the Tata Institute of Fundamental Research spoke on *Artless Innocents and Ivory Tower Sophisticates: Some Personalities on the Indian Mathematical Scene*. In this lecture, held on 20 March 2003, Prof. Raghunathan gave a glimpse of some great Indian mathematicians.

iii) A special lecture was organised in collaboration with the British Council, Eastern India on 24 March 2003. Professor Norman Myers, noted Consultant on Environment and Development spoke on *Sustainable Development : A Time of Breakdown or Breakthrough?*

A new series called *Calcutta Colloquium/ Kolkata Kolon* has been launched by the Centre from April 2002. This colloquium is being held on the first Friday of every month. The idea is to have established scientists' talk at a level accessible to M. Sc. students of science. The speakers and topics so far have been :

Prof. Bikash Ch. Sinha, Director, SINP on *Glimpses of Engaging Excellence*, (April 2002); Dr. Kalyan Sinha, Director, ISI on *Role of Physics in Mathematics and Vice-Versa*, (May 2002); Dr. Ajit Sinha, Director, IUC on *Opportunities in Experimental Sciences with Accelerators*, (June 2002); Prof. H. S. Mani, SNBNCBS on *Time Reversal Invariance in Particle Physics*, (July 2002); Dr. H. S. Maiti, Director, Central Glass and Ceramic Research Institute on *Materials Science at the Core of Modern Technology: A Few Examples*, (August, 2002); Prof. Debashis

Mukherjee, Director, Indian Association for the Cultivation of Science on *Chemistry at the turn of the Century*, (September 2002); Dr. Rakesh Bhandari, VECC on *Experiments at the VECC*, (October 2002); Prof. Dipankar Chakravorty, IACS on *Nanomaterials Science*, (November 2002); Prof. D. P. Burma, Ex-Professor, BHU on *What is Life?* (December 2002); Prof. R. Rajaraman, School of Physical Sciences, JNU on *Risks in Possessing and Deploying Nuclear Weapons* (January 2003); Prof. H. Y. Mohan Ram, Centre for Environmental Management of Degraded Ecosystems on *Seeds of Change*, (February 2003) and Prof. Avinash Khare, IOP, Bhubaneswar, *Supersymmetry in Quantum Mechanics*, (March 2003).

Like previous years the Centre had organised a meeting during 2-4 January 2003 on *India and Abroad III: A conference in Condensed Matter Physics*. The conference consisted of 10 sessions of lectures by invited speakers, 2 poster sessions and a session on general discussion at the end. The topics covered were : 1) Bose Einstein Condensation, 2) Novel Materials, Nano Materials and Materials Science, 3) Strongly Correlated Systems, 4) Soft Matter and Biology, and 5) Statistical Physics in interdisciplinary areas. There were 27 invited speakers, 20 posters and 87 registered participants. The level of the talks in this meeting was uniformly high and the discussions were spirited. All the participants agreed that such a winter meet with a wide scope covering a broad range of condensed matter physics was extremely useful to the community.

A national symposium on *Colossal Magnetoresistance in Rare-earth Manganites* was held during 7-10 January 2003. There were a total of 48 participants in all. The Symposium started with two review talks by T. V. Ramakrishnan and A. K. Raychaudhuri on the theoretical and experimental aspects of rare-earth manganites respectively. A special lecture was

also given by C. N. R. Rao on 8 January, 2003 followed by another review talk by H. R. Krishnamurthy. There were 19 other speakers speaking on a variety of experimental results and theoretical understanding of some of them. The discussions and brain-storming sessions were centered around getting a clear understanding of the present status in these systems and of possible approaches of the future in understanding these rich systems. To encourage younger participants to present their work, poster sessions were held on 8- 9 January, 2003. Overall, the Symposium was a very focussed attempt to discuss the latest experiments done especially in Indian laboratories and to obtain a theoretical understanding of the results of these experiments.

A two-day *Discussion Meeting on Seismotectonics and Climate* was organised at the Centre by Prof. D. Mukhopadhyay of Calcutta University during 28-29 October 2002. Prof. Peter Molnar, University of Colorado was the key-note speaker.

A three-week long *Lecture Course on Turbulence* was held during 3-21 March 2003. This course focussed on issues such as non-linear dynamics, Kolmogorov scenario of scaling and numerical analysis of turbulence, and tried to create an awareness among the student community, wanting to embark on this area of research. The speakers included Prof. J. K. Bhattacharya (IACS, Kolkata), Dr. Rama Govindarajan (JNCASR, Bangalore), Prof. R. Pandit (IISc., Bangalore) and Prof. S. Thomae (University of Essen).

Amongst other organisational activities, I might mention :

- i) The *Summer Programme of Kishore Vaigyanik Protsaban Yojna (KVPY) Fellows* (1-13 July 2002);
- ii) The *Shyama Prasad Mukherjee (SPM) Fellowship Test* of CSIR (July 2002);



- iii) The *KPVY Aptitude Test* of DST (August 2002); and
- iv) The Indian Academy of Sciences sponsored *Refresher Course on Spectroscopy, Chemical Reactions and Biology*, for college and university teachers (21 November-1 December 2002 at Viswa-Bharati, Shantiniketan and 3-7 December 2002 at the S. N. Bose National Centre). In all 15 lecturers had participated.

I should also mention here that during the Xth Plan period we have endeavoured to put more focus into our research keeping in mind the necessity to avoid duplication and to emphasize on new emerging areas. Some of the identified areas are: Nanomaterials, Mesoscopic and Optimal Systems, Mathematical Modelling and Interphase of Biological and Physical Sciences. In this context, the Centre is making continued effort to network into research activities with the other institutes in the Kolkata region. In particular, we are trying to revive the great tradition of the subject of Optics, be it Classical Optics, Quantum Optics, Nonlinear Optics or Mesoscopic Optics. It is felt that the S. N. Bose National Centre is favourably poised to make a mark in Optics-related areas as there exists already a critical mass of scientists working on various aspects of Optics. The Centre plans to set up an Optics laboratory, both at the research and institutional levels, which is expected to include, starting from basic experiments in Geometrical and Physical Optics, expansion into areas of Nonlinear Optics, Optoelectronics and Quantum Optics etc. In this laboratory we also plan to develop several interference techniques. In our attempt to put focus onto our work and encourage collaborative research we organised, like last year, an *In-house meeting* of the Centre on 30-31 December 2002. All the students, research scholars, post doctoral scholars and faculty had presented a 15 minute talk, which enabled us to

get acquainted with the activities of the Centre.

It is a matter of great gratification to report that our post B.Sc.-integrated Ph.D. programme has successfully entered its third year of operation. The students, in addition to taking courses from a number of excellent teachers drawn from all points of Kolkata, are also able to access laboratory facilities of institutes like the Saha Institute of Nuclear Physics and the Bose Institute. The students are making full use of a residential campus which is looking greener and very eco-friendly.

Finally, it is a pleasure to note that a number of academic honours has been received by the Centre's faculty. Amongst others, Prof. H. S. Mani received the Meghnad Saha Award of the University Grants Commission. Dr. Tanusri Saha Dasgupta has a DST-NSF grant jointly with Prof. S. Satpathy of the University of Missouri during 2003-2004. Dr. S. S. Manna has been made an Associate of ICTP (upto 2006). Dr. R. Banerjee was made a member of the International Advisory Committee for the Eugene Wigner Centennial Conference, held in Pecs, Hungary from 8-12 July 2002. Dr. K. Mandal has received an Alexander-von-Humboldt(AvH) Fellowship in work in Germany. Prof. S. Dattagupta was invited by AvH foundation to visit Germany under their "Follow Up" programme. He was also the recipient of the Bibharani Devi Prize of Calcutta University and the DAE Raja Ramanna Award of the Jawaharlal Nehru Centre for Advanced Scientific Research.

Like previous years, Ms. Shohini Majumder and Dr. V. K. Thomas have worked hard to put the Annual Report to order, including the Hindi section. It is a pleasure to record my appreciation for their efforts.

**S. Dattagupta**  
*Director*

## Report from Dean, Academic Programme

The post BSc. integrated Ph.D Programme entered its second year. The new batch of six students were selected, as usual, from the successful candidates of the All India JEST 2002 and NGPE 2002 toppers. Collaborative teaching with our sister institutes in this programme continued successfully throughout the year. This unique experiment with selected teachers not only from our Centre, but also from the Saha Institute, VECC, Indian Association for the Cultivation of Science, J.C. Bose Institute and Jadavpur University and St. Xavier's and Vidyasagar Colleges was one of the main features of this novel programme. During the summer the students carried out experimental projects with the Saha Institute of Nuclear Physics.

We also continued with our Post MSc programme with nine students selected from JEST, 2002. For lack of good candidates, we did not select any students from the SAARC countries. We decided to advertise our programme more aggressively next year in the neighbouring countries.

Two research scholars submitted their Ph.D theses with the Jadavpur University :

Indranil Chattopadhyay and Tapas Kumar Mitra. Dr. P.A. Sreeram joined our Centre as a Computer Scientist and took over the charge of the Computer Centre. Dr. Ranjit Biswas joined our Faculty during the year. Drs. Monideepa Mitra and Biplab Ganguli continued as Research Associates, while Dr. Sumita Dutta joined as Research Associate during the year.

Our two senior scientists, Profs. Binayak Dutta-Roy and H.S. Mani were with us throughout the year, advising us on our scientific and teaching programmes and participating wholeheartedly in both. Our Faculty again participated in the teaching programmes of the Calcutta University and Presidency College.

Finally, ending on an upbeat note, the morale of the Centre's faculty received a strong boost from the extremely positive assessment of the External Committee, set up by the DST, which met last year under the chairmanship of Prof. G. S. Agarwal.

**Abhijit Mookerjee**  
*Dean, Academic Programme*

## Seminars and Colloquia

The following speakers delivered talks at the various seminars organised at the Centre during 2002-03.

- **De, S. K.**, VECC, Kolkata, *Harnessing Quantum Effects for Computation*, April 23, 2002.
- **Khare, Avinash**, Institute of Physics, Bhubaneswar, *Linear Superposition for Nonlinear Equations and New Identities for Jacobi Elliptic Functions*, May 6, 2002.
- **Haridass, N. D.**, Institute of Mathematical Sciences, Chennai, *Compositeness in Quantum Field Theory*, June 25, 2002.
- **Das, Dibyendu**, Brandeis University, *Glassy Dynamics in Dimer Models*, August 7, 2002.
- **Ramachandran, R.**, Harish-Chandra Research Institute, Allahabad, *Non-Commutative Quantum Mechanics and Landau Levels*, August 12, 2002.
- **Narayan, Onuttom**, University of California, Santa Cruz, USA, *Heat Conduction in One Dimension* August 26, 2002.
- **Rahman, Naseem**, University of Trieste, Trieste, Italy, *Quantum Chaos and Molecules*, December 2, 2002.
- **Pal, Palash**, SINP, Kolkata, *Physics Nobel Prize for 2002*, December 3, 2002.
- **Kayal, Neeraj**, IIT, Kanpur, *The AKS Primality Testing Algorithm*, December 17, 2002.
- **Mukhopadhyay, G.**, IIT, Mumbai, *Theoretical Modelling of Polarizability of Biological Cells*, December 20, 2002.
- **Ghosh, Sibasish**, ISI Kolkata, *Quantum Information Theory*, December 18 & 19, 2002.
- **Agarwal, G. S.**, Physical Research Laboratory, Ahmedabad, *Heisenberg Uncertainty Relations and Quantum Optics*, January 28, 2003.
- **Shukla, Probodh**, NEHU, Shillong, *Surprises in a Driven Random Field Ising Model*, February 11, 2003.
- **Khare, Avinash**, Institute of Physics, Bhubaneswar, *The Phase of the Riemann Zeta Function*, March 6, 2003.
- **Raghunathan, M. S.**, TIFR, Mumbai, *Artless Innocents and Ivory Tower Sophisticates: Some Personalities on the Indian Mathematical Scene*, March 20, 2003.
- **Myers, Norman**, Consultant in Environment and Development, *Sustainable Development : A Time of Breakdown or Breakthrough?*, March 24, 2003.
- **Bhattacharyya, Amitabha**, Institut Francais du Petrole, Rueil Malmaison, France, *Mixed Surfactant Poly-electrolyte Systems : Surface Rheology and Other Properties*, March 26, 2003.

**M. Sanjay Kumar**  
Seminar Secretary

## The Theoretical Physics Seminar Circuit (TPSC)

The TPSC has nine main centres and ten associate centres under various main centres. Kolkata is one of the main centres with Shantiniketan and North East consortium (operating from IIT-Guwahati) as its two associate centres. The Kolkata Centre operates from the SNBNCBS and it also coordinates the entire TPSC activities of the Circuit. The Director, SNBNCBS is the Chairman of the National Committee of the TPSC. Dr. Sugato Mukherjee and Dr. M. Mathur are the Conveners of the Kolkata Centre.

This year a home page has been created (<http://www.bose.res.in/tpsc>) for TPSC. This page includes all the information regarding TPSC activities including the lists of category A and Category B speakers. The home page should henceforth simplify the category A and B speakers nominations enormously. We also hope this will make TPSC more popular amongst Ph. D. students.

In the Academic Programme Advisory Committee meeting of the Centre held in January 2003, the following decisions taken regarding TPSC are worth mentioning :

- 1) IIT-Kharagpur's request to become a TPSC centre should be entertained and it should become an associate centre (associated with Kolkata) from April 2003.

- 2) The total TPSC grant should increase from Rs. 10 lacs to Rs. 12 lacs.

The following TPSC visitors delivered talks at the SNBNCBS between April 2002 and March 2003:

- **Shenoy, Subodh**, Abdus-Salam ICTP, Trieste, Italy, *Bose-Einstein Condensates and Josephson Tunneling*, January 9, 2003.
- **Anishetty, Ramesh**, IMSc., Chennai, *Perturbative QCD with String Tension : Chiral Symmetry, Mesons Light and Heavy*, February 21, 2003.
- **Bhattacharya, Dipankar**, Raman Research Institute, Bangalore, *Neutron Stars and their Magnetic Field*, February 26, 2003.
- **Mishra, S. G.**, Institute of Physics, Bhubaneswar, *Ferromagnetism and Superconductivity in Fe and ZrZn<sub>2</sub>*, March 12, 2003.
- **Marino, Eduardo**, Federal University of Rio de Janeiro, Brazil, *Quantum Membranes, Strings and Duality in Generalized BF and Chern - Simons Theories in Higher Dimensions*, February 22, 2002.

**Sugato Mukherjee & Manu Mathur**  
Conveners, TPSC

## Visitors at the Centre

Apart from the Seminar, TPSC and Guest Speakers who visited the Centre from time to time last year, the following scientists also came to work at the Centre during 2002-03:

1. **Mr. Gautam Mukhopadhyay**, Lecturer, Bidhan Chandra College, Asansol, *ref.* S. S. Manna (from 10th May 2002 for two months).
2. **Mr. Rana Khan**, Bidhannagar Government High School, *ref.* Sandip Chakrabarti (from 16 May 2002).
3. **Prof. Mannan Mirdha**, Royal Institute of Technology, Stockholm, *ref.* P. K. Mukhopadhyay (10 -14 June 2002).
4. **Dr. Ashim Roy**, Indian Statistical Institute, *ref.* S. K. Sharma (from 1 August 2002 for 3 months).
5. **Ms. Tanima Banerjee**, IIT Madras, *ref.* Jaydeb Chakraborti (from 6 August 2002).
6. **Prof. R. Ramachandran**, Harish Chandra Research Institute, Allahabad, *ref.* Abhijit Mookerjee (10-14 August 2002).
7. **Mr. Anisur Rahaman**, Durgapur Government College, *ref.* Prosenjit Singha Deo (from 26 August 2002).
8. **Mr. Gour Bhattacharya**, Taki Government College, *ref.* Rabin Banerjee (from 3 September 2002).
9. **Mr. Kinshuk Acharya**, *ref.* Sandip Chakrabarti (from 16 September 2002).
10. **Dr. P. N. Sen**, Schulumberger-Doll Research, Ridgefield *ref.* S. Dattagupta.
11. **Dr. A. K. Mishra**, Mithila University, *ref.* Abhijit Mookerjee (27-29 March 2003).

## The Committees

### Governing Body

The composition of the Governing Body of the Centre during the year 2002-2003 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*  
*Vice Chancellor*  
*Allahabad University*  
*Allahabad*
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. S. Dattagupta** *Member*  
*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 the year:

1. **Professor S. Dattagupta** *Chairman*  
*Director, SNBNCBS, Kolkata*
2. **Professor A. K. Roy Chaudhuri** *Member*  
*Indian Institute of Science*  
*Bangalore*
3. **Professor R. Ramachandran** *Member*  
*Harishb Chandra Research Institute*  
*Allahabad*
4. **Joint Secretary & Financial Adviser** *Member*  
**or his Nominee,**  
*DST, New Delhi*
5. **Administrative Officer** *Member-Secretary*  
*SNBNCBS, Kolkata*

Professor A. K. Roy Chaudhuri and Professor R. Ramachandran have been nominated as Members of Finance Committee for a period of 5 years starting from June 2000.

### Building Committee

The members of the Committee for the year 2002-03 are :

1. **Professor S. Dattagupta** *Chairman*  
*Director, SNBNCBS, Kolkata*
2. **Shri P. C. Koteswara Rao** *Member*  
*Director, Civil Engineering Group (Retd.)*  
*Department of Atomic Energy,*  
*IGCAR, Kalpakkam*
3. **Shri T. V. Prabhakaran** *Member*  
*Director (Infrastructure)(Retd.)*  
*NTPC, Chennai*
4. **Prof. H. S. Mani** *Member*  
*Visiting Professor, SNBNCBS*  
*Ex-Director, HRI, Allahabad*
5. **Mr C. Vaswani** *Member*  
*Ex-Chief Engineer, CPWD(ER)*
6. **Shri Ranadhir Dey** *Member*  
*Project Manager, (SO/SG), VECC, Kolkata*

### Academic Programme Advisory Committee

During the year 2002-2003, the Academic Programme Advisory Committee of the Centre consisted of the following members:

1. **Professor G. S. Agarwal** *Chairman*  
*Director, PRL*  
*Ahmedabad*
2. **Professor K. B. Sinha** *Member*  
*Director, ISI*  
*Kolkata*
3. **Professor R. Nityananda** *Member*  
*Director, NCRA*  
*Pune*
4. **Professor N. Sathyamurthy** *Member*  
*Chemistry Department, IIT*  
*Kanpur*
5. **Professor A. K. Sood** *Member*  
*Divisional Chairman, Physical Sciences*  
*IISc., Bangalore*
6. **Professor S. Dattagupta** *Member*  
*Director, SNBNCBS*  
*Kolkata*
7. **Professor A. Mookerjee** *Member*  
*Dean (Academic Programme)*  
*SNBNCBS, Kolkata*
8. **Dr. R. Banerjee** *Member*  
*SNBNCBS, Kolkata*
9. **Dr. S. S. Manna** *Member*  
*SNBNCBS, Kolkata*
10. **Dr. N. Nayak** *Member*  
*SNBNCBS, Kolkata*

The APAC constituted by the GB has come into vogue from June 2001.



## The Staff and the Students

### The Faculty

Name	Designation	Ph. D. from	Year	Area of Research
Sushanta Dattagupta	<i>Professor &amp; Director</i>	Brookhaven National Laboratory	1973	Structure and Dynamics of Condensed Matter Physics
Abhijit Mookerjee	<i>Sr. Professor &amp; Dean</i>	University of Cambridge	1973	Physics of Materials
Sandip K. Chakrabarti	<i>Associate Professor</i>	University of Chicago	1985	Astrophysics
Subodh Kumar Sharma	<i>Associate Professor</i>	S. I. N. P. ( <i>University of Calcutta</i> )	1977	Light Scattering
Nilakantha Nayak	<i>Associate Professor</i>	I. I. T., Kharagpur	1978	Quantum Optics and Laser Physics
Rabin Banerjee	<i>Associate Professor</i>	S. I. N. P. ( <i>University of Calcutta</i> )	1988	Quantum Field Theory
Anita Mehta	<i>Associate Professor</i>	University of Oxford	1986	Soft Condensed Matter and Complex Systems
Subhrangshu Sekhar Manna	<i>Associate Professor</i>	S. I. N. P. ( <i>University of Calcutta</i> )	1987	Statistical Mechanics
Debashis Gangopadhyay	<i>Reader</i>	S. I. N. P. ( <i>Jadavpur University</i> )	1988	Quantum Field Theory
Srilekha Banerjee	<i>Reader</i>	University of Calcutta	1982	Soft Condensed Matter
Samir Kumar Pal	<i>Reader</i>	I. O. P. B. ( <i>Utkal University</i> )	1989	Mathematical Physics
P. Singha Deo	<i>Reader</i>	I. O. P. B. ( <i>Utkal University</i> )	1996	Mesoscopic Systems
M. Sanjay Kumar	<i>Reader</i>	University of Hyderabad	1989	Quantum Optics
Manu Mathur	<i>Reader</i>	I. M. Sc. ( <i>University of Madras</i> )	1993	Quantum Field Theory & QCD
Rudra Prakash Malik	<i>Reader</i>	I. O. P. B. ( <i>Utkal University</i> )	1989	Quantum Field Theory
Surajit Sengupta	<i>Reader</i>	I. I. Sc., Bangalore	1992	Theoretical Condensed Matter Physics

Name	Designation	Ph. D. from	Year	Area of Research
Sugata Mukherjee	Reader ( <i>w.e.f. 1.1.03</i> )	Frei Universitat, Berlin	1985	Physics of Materials
Amitabha Lahiri	Reader ( <i>w.e.f. 1.1.03</i> )	Syracuse University	1991	Quantum Field Theory
Ranjan Chaudhury	Faculty Fellow	T. I. F. R. ( <i>University of Mumbai</i> )	1988	Condensed Matter Theory
Pratip K. Mukhopadhyay	Faculty Fellow	I. I. Sc., Bangalore	1989	Experimental Condensed Matter Physics
Partha Guha	Faculty Fellow	University of Oxford	1996	Mathematics
Anilesh Mohari	Faculty Fellow	I. S. I., Delhi	1992	Mathematics
Gautam Gangopadhyay	Faculty Fellow	I. A. C. S. ( <i>Jadavpur University</i> )	1993	Chemical Physics
Biswajit Chakraborty	Faculty Fellow	I. M. Sc ( <i>University of Madras</i> )	1993	Quantum Field Theory
Archan S. Majumdar	Faculty Fellow	University of Delhi	1994	Foundations of Quantum Theory and Cosmology
Jaydeb Chakrabarti	Faculty Fellow	I. I. Sc., Bangalore	1995	Soft Condensed Matter and Complex Systems
Kalyan Mandal	Faculty Fellow ( <i>w.e.f. 1.1.02</i> )	I. I. T., Kharagpur	1994	Experimental Condensed Matter
Tanusri Saha Dasgupta	Faculty Fellow ( <i>w.e.f. 1.1.02</i> )	SNBNCBS <i>University of Calcutta</i>	1995	Physics of Materials
Ranjit Biswas	Faculty Fellow ( <i>w.e.f. 1.10.02</i> )	I. I. Sc., Bangalore	1995	Physical Chemistry/ Chemical Physics
P. A. Sreeram	Computer Scientist ( <i>w.e.f. 1.6.02</i> )	I. O. P., Bhubaneswar		Quantum Many Body Theory

### Senior Scientists

Binayak Dutta-Roy

H. S. Mani

### Research Associates

Manideepa Mitra	<i>Condensed Matter Physics</i>
Sumita Datta	<i>Statistical Mechanics (joined: August 2002)</i>
Uday Kumar	<i>Expt. Cond. Matter Physics (joined: October 2002)</i>
Manoj Samal	<i>Quantum Field Theory (left: August 2002)</i>
Biplab Ganguly	<i>Condensed Matter Physics* (left: March 2003)</i>
Abhijit Bhattacharya	<i>Astrophysics (left: August 2002)**</i>

\* *working in the Warwick Project under Prof. Abhijit Mookerjee*

\*\* *working in an ISRO Project under Dr. Sandip Chakraborty*

### Library

V. K. Thomas - *Librarian*

Ruma Majumdar, *Trainee, Library*

### Computer-in-Charge

P.A. Sreeram, *Computer Scientist*

### Administrative, Technical and Auxiliary Staff

Rina Das	<i>Scientific Officer 'D' (In-charge, Braille Project)</i>
Dulal Chandra Banerjee	<i>Officer on Special Duty/Acting Administrative Officer</i>
Apurba Kanti Sarkar	<i>Accounts Officer</i>
Sunish Kumar Deb	<i>Section Officer</i>
Shohini Majumder	<i>Administrative Assistant (Communications)</i>
Dipti Prakash Banerjee	<i>Office Superintendent</i>
Sukanta Mukherjee	<i>Assistant (General)</i>
Tapan Kumar Sen	<i>Assistant</i>
Sanad Kumar Shukla	<i>Assistant</i>
Sirsendu Ghosh	<i>Senior Stenographer</i>
Santosh Kumar Singh	<i>Stenographer</i>
Jaydeep Kar	<i>Upper Division Clerk</i>

Prasenjit Talukdar	<i>Upper Division Clerk</i>
Gopal Chandra Ghosh	<i>In-charge of General Amenities</i>
Shiba Prasad Nayak	<i>Pump Operator</i>
Aditya Pal Choudhury	<i>Project Assistant</i>
Sushanta Kumar Biswas	<i>Driver</i>
Bijoy Kumar Pramanik	<i>Guest House Attendant</i>
Arun Kumar Bhattacharya	<i>Library Stack Attendant</i>
Bhupati Naskar	<i>Library Stack Attendant</i>
Pradip Kumar Bose	<i>Tradesman 'A'</i>
Partha Chakraborty	<i>Attendant</i>
Partha Mitra	<i>Attendant</i>
Ratan Acharya	<i>Attendant</i>
Swapan Ghosh	<i>Attendant</i>

### Engineering

S. K. Banerjee	<i>Consultant (Engineering) (left: April 2002)</i>
B. K. Bhattacharyya	<i>Engineer (joined: May 2002)</i>
Shibaji Das	<i>Jr. Engineer (joined: November 2002)</i>

### Personnel with Temporary Status

Sudhanshu Chakraborty, <i>Attendant</i> (EPABX/Accounts)
Biman Roy, <i>Attendant</i> (Despatch Section)
Sukamal Das, <i>Attendant</i> (Maintenance)
Dulal Chatterjee, <i>Attendant</i> (Maintenance)
Somnath Roy, <i>Attendant</i> (Accounts/Administration)
Nimai Naskar, <i>Gardener</i>
Biswanath Das, <i>Gardener</i>
Rabi Orao, <i>Gardener</i>
Hiralal Das, <i>Cleaner</i>
Ramchandra Das, <i>Cleaner</i>
Motilal Das, <i>Cleaner</i>
Prakash Das, <i>Cleaner</i>
Kartick Das, <i>Cleaner</i>

## Students

### Senior Research Fellows

Indranil Chattopadhyay	<i>Astrophysics (left: Sept. 2002)</i>
Sivakumar G. Manickam	<i>Astrophysics<sup>#</sup></i>
Tomy Scaria	<i>Quantum Field Theory</i>
Anuj Nandi	<i>Astrophysics<sup>#</sup></i>
Dipankar Rana	<i>Chemical Physics<sup>**</sup></i>
Durga Paudyal	<i>Condensed Matter Physics</i>
Kamal Krishna Saha	<i>Condensed Matter Physics</i>
Rumani Karmakar	<i>Statistical Physics</i>
Santabrata Das	<i>Astrophysics<sup>#</sup></i>
Sumana Banerjee	<i>Chemical Physics</i>
Swarnali Bandopadhyay	<i>Mesoscopic System</i>
Abhishek Choudhuri	<i>Condensed Matter Physics</i>
Ain-Ul Huda	<i>Condensed Matter Physics</i>
Manirul Md. Ali	<i>Foundations of Quantum Mechanics</i>
Sujata Paul	<i>Statistical Mechanics/Chemical Physics</i>
Suvankar Chakraborty	<i>Condensed Matter Physics</i>
Mukul Kabir	<i>Condensed Matter Physics*</i>
Monodeep Chakrabarti	<i>Condensed Matter Physics*</i>

<sup>#</sup> working in projects under Dr. Sandip Chakraborty

<sup>\*</sup> working in the Warwick Project under Prof. Abhijit Mookerjee

<sup>\*\*</sup> working as External Candidate under Dr. G. Gangopadhyay since October 2000

### Junior Research Fellows

Aftab Alam	<i>Condensed Matter Theory</i>
Ankush Sengupta	<i>Soft Condensed Matter</i>
Debashis Chaudhuri	<i>Condensed Matter Physics</i>
Kuldeep Kumar	<i>High Energy Physics</i>
Prasad Basu	<i>(left)</i>
Soumen Mondal	<i>Astrophysics</i>

## Post M.Sc. Students

Biplab Ghosh  
Jayee Bhattacharya  
Jayeeta Lahiri\*  
Malay Bandopadhyay  
Nupur Mukherjee  
Subarna Mitra  
Sudeshna Samanta  
Suman Sinha  
Swati Routh (*left*)  
Swayambhoo Mitra

\* *Working in a project of Dr. K. Mandal*

Post B. Sc. Integrated Ph. D. Students (1<sup>st</sup> batch: 2001)

Abhishek Pandey  
Debabrata Dutta  
Manas Kumar Roy  
Mrinal Kanti Bera  
Mutta Venkata Kamalakar  
Navin Chandra  
Shashank Shalgar  
Sunandan Gangopadhyay  
Swati Bhattacharya

Post B. Sc. Integrated Ph. D. Students (2<sup>nd</sup> batch: 2002)

Ashis Bakshi  
Chandrasekhar Chatterjee  
Saikat Chatterjee  
Santosh Roy  
Soma Das  
Tapati Sarkar

## Facilities

### Computer Centre

The following are the activities of the computer centre of SNBNCBS for the year 2002-03:

- PC's were provided to all the present faculty.
- A file server was procured to centralise the storage of files. The server has 5 hot swappable hard disks of 73.5 GB capacity. It is configured with RAID 5 for data protection and has 2 GB Ram and redundant power supply.
- A new Hp duplex printer was procured for the computer centre to replace the previous simplex printer which is to be transferred to the student's section in the first floor.
- 2 new PCs were bought with CD writers for easy backup of files on CD and also to increase the potential of computerisation.
- A high end workstation is being bought in lieu of two old SGI machines.
- We are in the process of procuring a 4 + 1 node diskless Beowulf cluster based on Intel Pentium Xeon architecture. As far as we know, this is the first diskless Beowulf Cluster of its kind in the eastern part of India and also probably the first in India. The 4 slave nodes and the master node will have hyperthreading enabled and will be connected by a Gigabit switch. The Centre will be doing a lot of Research and Development on this cluster on the Physics research front and also on Cluster architecture.
- A 3 KVA UPS was procured for the Library server machine to give a 24x7x365 uptime.

**Surajit Sengupta & P. A. Sreeram**

*Computer-in-Charge, Academics*

### Library

- The SNB Library collection comprises of documents in the field of Basic Sciences especially Physics, Mathematics, Chemistry, Electronics, Biology, Computer Science, History of Science etc. The Library added 1,491 books to its stock in the year under report, costing Rs. 38.89 lakhs. It added seven new journals taking the total number of scientific journals subscribed to 53. Of these, 33 had online facility. The total expenditure amounted to Rs. 60.60 lakhs including subscription to online archive of IOP and Journal of Chemical Physics. Besides, 13 journals are received free. The Library also subscribed to 11 magazines and 8 newspapers.
- The Library makes provision for the general reading too. Books in social sciences and humanities and some magazines and papers are purchased for this purpose. The institutional member at the British Council Library also enhanced this service.

During the year the Library initiated/ continued with the following services:

- The main thrust of the year has been on computerisation of the Library. The software identified and purchased has been LIBSYS 4 (on Linux platform). The Library staff were trained in the use of the software. A server (Pro Liant ML350G2 base machine) and 3 PCs excluding a multimedia were also added.
- The physical facilities in the Library had been vastly improved through better seating arrangements, flooring, furniture, curtaining.

- Photocopying of library materials to supplement the lending and reference service has been vastly improved. About 8,200 pages had been photocopied during the year. Besides, the Library extended services like spiral binding, lamination and scanning.
- Established inter-library loan facility with ISI Library, Salt Lake, Kolkata.
- The S.N. Bose Archive set up in the Library was inaugurated by Gen. (*Retd.*) Sankar Ray Choudhury, M. P. on 4 July 2002. It contained 5 display racks covering various aspects of the life and work of S. N. Bose.

The Library is open all days except six national holidays of the year.

The Library hours are:

Monday–Friday: 8.00 am to 8.00 pm.

Saturdays, Sundays and Holidays:

9.00 am to 5.30 pm.

#### **V. K. Thomas**

*Librarian*

### **Laboratory for Condensed Matter Physics**

The CSIR project on Vibrating reed apparatus included a position for an Research Association Out of the five candidates, three were called for interview and one joined towards the end of October, 2002. Now the experiments are on the way. Some more nickel based magnetic alloy samples were also made in the Department of Physics, IIT, Kanpur, in March 2003. Annealing and shaping of them will be done to arrive at the final desired shapes and magnetic states. Also final round of equipment purchased from this project was completed during this year.

The ICTP project was also continued. It was on flux trapping in HiTc super conductors. Some excellent BSCCO samples were prepared and characterised during this period. The linear and nonlinear a.c. susceptibilities were also measured.

A new work with Dr. D. Das at IUC DAEF and others was started with Mg based Zn nano ferrites. Extensive a.c. susceptibility measurements were carried out for this system.

A summer project student from the Utkal University was trained for six weeks in May–June.

#### **Pratip Kr. Mukhopadhyay**

*Laboratory of Condensed Matter Physics*

### **C. K. Majumdar Laboratory**

During the financial year, April 2002–March 2003 some basic experiments on Nuclear Physics using GM Counter have been added in C. K. Majumdar Laboratory for Post B.Sc.-Integrated Ph. D. programme. One He-Ne LASER, some photodetectors have been purchased to enhance the activities of the optical section of this laboratory. C. K. Majumdar Laboratory is now well equipped for giving training on Analog and Digital Electronics, Optics, Solid State Physics and Nuclear Physics.

Department of Science and Technology has granted a project on ferrite nanoparticles to K. Mandal of C. K. Majumdar Laboratory. A vibrating sample magnetometer has been fabricated for magnetic measurements. Development of some other experimental setups is going on. Several conferences have been attended and talks have been delivered by the members of the laboratory. K. Mandal has been awarded ‘Humboldt Research Fellowship’ by Alexander von Humboldt Foundation, Germany.



*Students trained :* Nine students of second year and six students of first year of Post B. Sc. Integrated Ph. D. programme did their practical classes in C. K. Majumdar Laboratory. Three students worked in this laboratory for their summer projects during May-August 2002. S. Chakraverty and J. Lahiri have been working for their doctoral thesis.

*Publications:* Two papers have been published in international journals and four papers, in conference proceedings from C. K. Majumdar Laboratory.

**Kalyan Mondal**

*In-Charge, C. K. Majumdar Laboratory*

**Guest House**

The Centre has its 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. In the Guest House, there are 6 fully furnished air-conditioned suites with attached baths and kitchenettes, 10 single, 4 double fully air conditioned furnished rooms and 28 fully furnished non-airconditioned rooms with attached baths. The Guest House is catered with 24 hours STD/ISD facilities with attachment conferencing system including continuous attendance by experienced persons manned for the purpose.

**Sanad K. Shukla**

*Guest House In-Charge*

## Welfare Measures and Language Policy

The Centre is continuously making utmost effort to improve its general welfare and security measures, language 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 Volleyball Court to promote indoor/outdoor games extensively. 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. A car shed for parking Centre's vehicles has also been constructed keeping security considerations in mind.

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.

## Personal Profile

### I. Faculty

**Rabin Banerjee**

#### *Publications*

##### *(a) In journals*

1. **R. Banerjee** and P. Mukherjee, (2002), A canonical approach to the quantisation of the damped anharmonic oscillator, *J. Phys. A*, 35, 5591.
2. **R. Banerjee**, B. Chakraborty and S. Ghosh, (2002), Noncommutativity in an open string: New results in a gauge independent approach, *Phys. Lett. B*, 537, 340.
3. **R. Banerjee**, (2003), Noncommuting electric fields and algebraic consistency in noncommutative gauge theories, *Phys. Rev. D*, 67, 105002.

##### *(b) In conference proceedings*

**R. Banerjee**, Wigner's little group as a generator of gauge transformations, (July 2002), in *Proceedings of the Wigner Centennial Conference held at Pecs, Hungary, 2002* (published in Heavy-ion Physics and Quantum Electronics (new series of Acta Physica Hungarica).

#### *Conferences/Workshops/Symposia attended*

1. Invited speaker at the *Wigner Centennial Conference* held in honour of Eugene Wigner's hundredth birth anniversary, at Pecs, Hungary, July, 2002. Also chaired a session.
2. Invited speaker at the *Quantum Field Theory Workshop* held at the Yukawa Institute of Theoretical Physics, Kyoto University, Kyoto, Japan, December 2002.

#### *Talks given*

1. *Wigner's little group as a generator of gauge transformations*, Wigner Centennial Conference at Pecs, Hungary, July 2002.
2. *Noncommutativity in an open string: a gauge independent analysis*, I.I.T Kanpur (TPSC, June 2002) and Chiba University, Physics Department, Chiba, Japan, February 2003.
3. *Axial anomaly in noncommutative gauge theory and the Seiberg-Witten map*, I.I.T Kanpur (TPSC, June 2002), KEK High Energy Physics Laboratory, Tsukuba, Japan (October 2002), Nihon University Physics Department, Tokyo, Japan (October 2002) and Yukawa Institute, Kyoto University, Kyoto, Japan, (December 2002).
4. *Anomalies in noncommutative gauge theories, Seiberg-Witten map and Ramond-Ramond couplings*, Ochanomizu University, Physics Department, Tokyo, Japan, January 2003.

#### *Other scientific and educational activities*

1. TPSC speaker (senior category)
2. Co-supervisor of Mr. Tomy Scaria who submitted his Ph.D thesis entitled *Studies in certain planar field theories* at Jadavpur University (March 2003)
3. Supervising the Ph. D. thesis work of Mr. Kuldeep Kumar (CSIR fellow)
4. My invited talk at the Wigner Centennial Conference (Pecs, Hungary, July 2002) has now been included in the Electronic site maintained by MIT (USA) called *Net Advance of Physics*, in memorial to Nobelist, Henry Kendall.

## Srilekha Banerjee

### *Publications*

S. K. Sharma and **S. Banerjee**, (2003), Role of approximate phase functions in Monte Carlo simulation of light propagation in tissues, *J. Opt. A*, 5, 294-302.

### *Conferences/Symposia/Workshops attended*

*Symposium on Biology in the Post Genomic Era* held at SINP, 3 October 2002.

*Second In-House Meeting* held at SNBNCBS, 30-31 December 2002. Oral Presentation on *A Monte Carlo Model of Light Propagation in Tissue*.

### *Other scientific and educational activities*

Taught 1st Year Post BSc. (2002-03) at SNBNCBS: *Scientific Communication* (Numerical Methods and Programming: theory and practicals), January-April, 2003.

Guided a group of Kalyani University final year BTech. students on the project *Study of single component biomembranes using random lattice model*.

## Ranjit Biswas

### *Conferences/Workshops/Symposia/attended*

Presented 11 lectures in *Refresher Course on Spectroscopy, Chemical Reactions and Biology* jointly organised by S. N. Bose National Centre for Basic Sciences, Kolkata and Department of Physics, Viswabharati, Santiniketan.

## Jaydeb Chakrabarti

### *Publications*

1. **J. Chakrabarti**, (2003), Instabilities in a spatially correlated autocatalytic chemical system, *Journal of Chemical Physics*, 118, 249.

2. **J. Chakrabarti**, J. Dzubiela and H. Loewen, (2003), Dynamical Instabilities in driven colloids, *Euro Phys. Lett.*, 61, 415.

### *Talks given*

Talk on *Search Mechanism of Protein over DNA Chain* in National Centre for Biological Sciences Bangalore (March, 2003);

### *Other academic activities*

1. *Scientific and educational*: Taught a Post-M.Sc. course on *Advanced Statistical Mechanics*.
2. *Research Guidance*: Subhashis Chatterjee jointly with Prof. S. Roy on *Biology Inspired Physics*.
3. *Academic visit*: to Dr. Shivasashankar's group in NCBS, Bangalore during 23-27 March 2003.

## S. K. Chakrabarti

### *Publications*

#### *i) In journals*

1. **S. K. Chakrabarti**, P. Goldoni, P. J. Witta, A. Nandi, S. Das, (2002), On the ejection mechanism of bullets in SS 433, *Astrophys. J. Lett*, v.576, L45.
2. I. Chattopadhyay and **S. K. Chakrabarti**, (2002), Effects of radiative acceleration and radiation drag on outflows and Jets, *MNRAS*, 333, 454.
3. **S. K. Chakrabarti**, A. Nandi, S. Manickam, S. Mandal and A. R. Rao, (2002), Spectral signature of wind formation from post-shock region in GRS1915+105 accretion disk, *Astrophys. J. Lett.*, V. 579, p 21.
4. **S. K. Chakrabarti**, S. Pal, K. Acharya, S. Mandal, S. Chakrabarti, R. Khan, B. Bose, (2002), VLF observation during Leonid

- Meteor Shower-2002 from Kolkata, *Ind. J. Phys.*, v 76B, 693.
5. S. Naik, A. R. Rao and **S. K. Chakrabarti**, (2002), Fast transition between high-soft and low-soft states in GRS 1915+105: evidence for a critically viscous accretion Disk, *J. Astron. Astrophys.*, 23, 213.
  6. S. Das and **S. K. Chakrabarti**, (2002), Standing shocks around black holes and estimation of outflow rates, *J. Astron. Astrophys.*, 23, 143.
  7. I. Chattopadhyay and **S. K. Chakrabarti**, (2002), Radiatively driven winds from effective boundary layer around black holes, *J. Astron. Astrophys.* 23, 155.
  8. K. Acharya, **S. K. Chakrabarti**, D. Molteni, (2002), Interaction of accretion shocks with winds, *J. Astron. Astrophys.* 23, 155.
  9. **S. K. Chakrabarti**, (2002), How thick are the Saturn's Rings? in *Bulletin of the Astronomical Society of India*, V. 30, p.563.
- (ii) In proceedings**
1. **S. K. Chakrabarti**, (2002), Effect of an accretion disk on the gravitational wave signal from an inspiralling binary black holes, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 1639.
  2. **S. K. Chakrabarti** and I. Chattopadhyay, (2002), Bulk motion Comptonization — a sure sign of black holes, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2253.
  3. **S. K. Chakrabarti**, A. Nandi and S. G. Manickam, (2002), Relation of light curve behaviour with accretion rates in black hole candidate GRS1915+105, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2209.
  4. I. Chattopadhyay and **S. K. Chakrabarti**, (2002), Generation and acceleration of jets from effective boundary layer around black hole, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2289.
  5. **S. K. Chakrabarti**, (2002), State-of-the-art accretion and wind solutions around black holes, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 1613.
  6. **S. K. Chakrabarti**, S. G. Manickam, A. Nandi and A.R. Rao, 2002, Understanding galactic black hole candidate GRS 1915+105, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2279.
  7. D. Molteni, M.A. Valenza, G. Gerardi, **S. K. Chakrabarti**, K. Acharya, (2002), The many ways a shock wave can oscillate close to a black hole, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2257.
  8. A. Nandi and **S. K. Chakrabarti**, (2002), Understanding of the inflow/outflow Characteristics of the black hole candidate GRS 1915+105, in *Multicolour Universe*, Ed. R.K. Manchanda and B. Paul, 109.
- iii) Review articles**
1. **S. K. Chakrabarti**, (2002), 25 years with SS433 in *Exotic Stars as Challenges to Evolution*, Ed. W. Vanhamme & C. Tout, p. 5 (Astronomical Society of the Pacific: San Francisco).
  2. **S. K. Chakrabarti**, (2002), Study of accretion processes on black holes: Fifty years of developments in *Frontiers in Astrophysics* (Allied Publishers, New Delhi).
  3. **S. K. Chakrabarti**, (2002), Observational evidence for two component advective flow, solutions in a black hole geometry, in *Multi-wavelength Experiments through Astronomical Satellite*.

**iv) Books written**

1. S. K. Chakrabarti, (2002), *Active Galaxies for IGNOU*
2. S. K. Chakrabarti, (2002), *Milky Way for IGNOU*

**(v) Published Books**

S. K. Chakrabarti (guest Editor), *Frontiers in Astrophysics* (Allied Publishers, New Delhi).

**Invited Seminars and Colloquia**

Convener, District-wise Space Symposia organised by Centre for Space Physics, Kolkata held in East/West Medinipur, January 2003.

**Invited talks at Conferences and Symposia**

1. *Types of Data obtained through Astrophysical Observations*, invited talk at the Workshop on Techniques of Satellite Data Analysis at CSP, in July 2002.
2. *Mysterious Black Holes at the Silver Jubilee celebration of the Sky Watcher's Association* in October 2002.
3. *Constituents of the Universe and Mysterious Black Holes at the District-wise Space Science Symposium*, Khakurdaha, Midnapur in January 2003.

**Contributed talks at Conference and Symposia**

*Two Component Advective Flow Paradigm*, talk at the 4th Microquasar Conference at Cargese (Corsica) in May 2002.

**Teaching programme/Invited lectures delivered****(i) Teaching programme**

1. *Modern Astrophysics*, a series of two lectures at the Refresher Course for University teachers at Calcutta University in December 2002.
2. *Advanced course on Astrophysics*, a Post M.

Sc. course at S. N. Bose National Centre for Basic Sciences.

**(ii) Invited talks/Seminars attended**

1. *Variabilities of Galactic and Extra-galactic Black Holes* at the Nainital Observatory in April 2002.
2. *Advective Accretion Disks*, a Colloquium at Service d' Astrophysique, SACLAY (France) in May 2002.
3. *Advective Accretion Disks*, at National Centre for Radio Astrophysics, Pune in October 2002.
4. *Developments in Modern Astrophysics* at Positional Astronomy Centre, Alipore, Kolkata in October 2002.

**Research guidance****i) Doctoral students**

- I. Chattopadhyay (*Thesis submitted in September 2002*)  
 A. Nandi (*DST project*)  
 S. Das (*DST project*)  
 S. Manickam (*ISRO project*)  
 Soumen Mandal  
 Samir Mandal (*CSP, ISRO Project*)  
 S. Pal (*Jadavpur University and CSP, CSIR JRF, jointly with Prof. K. Goswami, JU*)  
 M.M. Samanta (*CSP*)  
 K. Acharya (*CSP, jointly with Dr. S. Chakrabarti*)

**(ii) Thesis submitted**

- I. Chattopadhyay submitted Thesis on *Studies of the Hydrodynamic and Radiative Acceleration Processes of Cosmic Radio Jets and Bipolar Outflows from Compact Objects*.

**(iii) Summer students**

- Priti Agarwal (North Bengal University) on *Production of jets*.

**Administrative work**

Member, Leave Committee, SNBNCBS

**Projects****(i) Principal Investigator of the Projects:**

1. Quasi-Periodic Oscillation of X-Rays from Black Holes funded by ISRO
2. Creation of a DATA Bank for Space Astronomy funded by ISRO
3. Analytical and Numerical studies of Advective Flows on Black Holes and Compact Stars funded by DST
4. A new project Emitted Radiation from two component accretion disks around black holes funded by DST and has been brought to SNBNCBS

**(ii) Co-Investigator of Projects:**

1. Synthesis of Biomolecules during Star formation and their detection in millimetre and microwaves
2. Structure of Protostars and Outflows during collapse and interstellar clouds and their relation to Complex organic molecule formation
3. Study of Polarization Properties of Radiation Emitted from Accretion Disks around Compact Objects
4. ASTROSAT - An Indian multi-wavelength Astronomy Satellite for Studies of Cosmic Source over a wide Spectral Band

**News item**

1. An article on my work in Statesman Newspaper (March, 2003)
2. An article on my work in Telegraph Newspaper (November 2002)

**Biswajit Chakraborty****Publications**

1. Rabin Banerjee, **Biswajit Chakraborty** and Subir Ghosh, (2002), Non-commutativity in open string: A gauge independent analysis, *Phys. Lett. B*, 537, 340-350.
2. Tomy Scaria and **Biswajit Chakraborty**, (2002), Wigner's Little group as a gauge generator in linearized gravity theories, *Class. Quant. Grav.*, 19, 4445-4462.

**Talks given**

1. Gave a talk on *Non-commutativity in open string* in the In-House meeting of the Centre, held at SNBNCBS in December 2002.
2. Gave a set of three talks on *Non-Euclidean Geometry* on July 2002, as a part of lecture series for the KVPY students, held at SNBNCBS.

**Other scientific and educational activities**

Supervised the Ph.D. thesis of Mr. Tomy Scaria (jointly with Dr. R. Banerjee).

**Ranjan Chaudhury****Visits and Conferences attended**

1. Visited Department of Physics, IISc. Bangalore for 2 weeks during August-September 2002 for collaboration with Professor B.S. Shastry.
2. Participated in *CMP (India and Abroad) III* in January 2003, held at SNBNCBS.
3. Participated in the *International Conference on Molecular Biology of Genetics*, held at Science City, Kolkata in January, 2003.

**Projects**

1. *Spin dynamics of antiferromagnetic Heisenberg Model on layered triangular lattice* in collaboration with Prof. B. Sriram Shastry (IISc., Bangalore).
2. *Spin stiffness constant and evolution of antiferromagnetism with doping in doped quantum antiferro magnet in 2D* with Prof. B. K. Chakraverty (CNRS, Grenoble, France).
3. *Segmentation of DNA Molecule* with Dr. J. Chakrabarti(IACS, Kolkata) and Dr. S. Acharya (Vivekananda College, Kolkata).

**Talks given**

*Spin dynamics and magnetic property of frustrated systems in two-dimensions* in the In-house meeting held in December, 2002 at SNBNCBS.

**Other scientific and educational activities**

1. Started teaching a course on *Superconductivity and Magnetism* (jointly with K. Mandal) for the Post-M.Sc. students from March, 2003.
2. Served as a member of the interview committee for the selection of Post-M.Sc. students in 2002.

**Rina Das****Braille Project**

1. Conducted Resource Teachers' Training programme for about twenty teachers of visually handicapped schools funded by the Department of Mass Education, Government of West Bengal.
2. The success of the above programme attracted some voluntary organisations in and around Kolkata and also from the north east region who have sent proposal for conducting residential training programs.

3. Project for transcribing Braille books for Honours course of Calcutta University students of different districts funded by West Bengal Book Board, Government of West Bengal is going in full swing and is soon to be completed.
4. Some pioneering work for import substitution of Personal Braille Printer is nearing completion.
5. Has transcribed Braille books for visually handicapped students of Higher Secondary and graduate students of Belur Ramakrishna Mission Vidyamandir.
6. Started work with partially blind students as a first step towards setting up of Low Vision Centre for the medico rehabilitative aspects of people with low vision.
7. Implementing the idea of setting up a Digital Library for Visually Handicapped persons initially at small scale as a concept proving measure.
8. Has been invited by the Vice-Chancellor, Jadavpur University to act as a member of a committee to implement the U. G. C. approved scheme to facilitate Higher Education for Persons with Special Needs (HEPSN). Under HEPSN, I am actively involved in setting up a BRAILLE CENTRE for Visually Handicapped students studying in undergraduate and postgraduate courses of Jadavpur University.
9. Started a Computerised Braille Training for Faculty members teaching visually handicapped students in various graduate and post graduate courses of Jadavpur University as well as the placement officer and student volunteers. This is being supported by the University under the HEPSN and is currently in operation at SNBNCBS.



## S. Dattagupta

### Teaching

Taught a course on *Spectroscopic Probes for the Structure and Dynamics of Condensed Matter* to the post B. Sc. integrated Ph. D. students.

### Publications

1. V. Banerjee and **S. Dattagupta**, (2002), Model Quantum Magnet - II : Calculation of NMR Lineshapes, *Phys. Rev. B*, 66, 064418-064427.
2. **S. Dattagupta**, (2003), Coherence Versus Decoherence, *Pramana*, 59, 203-219.
3. M. Mitra, P.A. Sreeram and **S. Dattagupta**, (2003), Polaronic Heat Capacity in the Anderson-Hasegawa Model, *Phys. Rev. B*, 67, 132406-132409.

### Talks given

1. On Linus Pauling's Work on the Nature of the Chemical Bond, in the National Seminar on Science, Scientists & Society, Jadavpur University, 12 April 2002.
2. Six lectures on *Nonequilibrium Statistical Mechanics*, summer school for M.Sc. students, organized by the Indian Institute of Astrophysics, Kodai Kanal, 3-6 June, 2002.
3. Valedictory lecture on *Science Education in India* at the Workshop of the Indian Association for Physics Teachers, Kalyani University, 22 June 2002.
4. *Coherence Versus Decoherence*, Freie Universität, Berlin, Germany, 26 July, 2002.
5. *Coherence Versus Decoherence*, Technical University of Munich, Garching, Germany, 30 July, 2002.

6. *Raman Lineshapes in Manganites*, Max Planck Institute, Stuttgart, Germany, 14 August 2002.
7. *Coherence Versus Decoherence*, University of Essen, Germany, 21 August 2002.
8. *Coherence Versus Decoherence*, University of Freiburg, Germany, 3 September 2002.
9. *Coherence Versus Decoherence*, Chemical Physics Colloquium, Pennsylvania State University, State College, USA, 4 October 2002.
10. Four lectures on *Spectroscopy & Correlation Functions*, in the Indian Academy's Refresher Course on 'Spectroscopy, Chemical Reactions and Biology', Viswa Bharati, 21-24 November 2002.
11. Invited talk on *Coherence Versus Decoherence*, at the Annual Symposium on Solid State Physics of the Department of Atomic Energy, Punjab University, Chandigarh, 27 December 2002.
12. *Dielectric Relaxation in Deuteron glasses*, in the In-house Symposium of the S. N. Bose National Centre, Kolkata during 30-31 December 2002.
13. Evening Lecture on *Coherence Versus Decoherence* in Theoretical Chemistry Symposium at the Indian Association for the Cultivation of Science, Kolkata, 18 January 2003.
14. Evening Lecture on *Dissipationless Decoherence* in Theoretical Physics Symposium at the Indian Association for the Cultivation of Science, Kolkata, 22 January 2003.
15. *Nanoscience* at the Workshop of the Indian Association for Physics Teachers, Scottish Church College, Kolkata on 22 March 2003.

**Conferences chaired**

1. A session in the *mid-year meeting of the Indian Academy of Sciences* during 4-7 July 2002.
2. Chaired the Physics session of the *annual meeting of the National Academy of Sciences*, North-Eastern Hill University, Shillong, during 24-27 October 2002.
3. A session at the *Theoretical Chemistry Symposium at the Indian Association for the Cultivation of Science*, Kolkata, 17 January 2003.
4. Felicitation session in honour of *Prof. Amal Kumar Raychaudhuri*, S. N. Bose National Centre, Kolkata, 23 January 2003.

**Membership of committees**

1. Convener, Sectional Committee in Physics and Member of Council of the Indian Academy of Sciences, Bangalore.
2. Member, Scrutinee Committee for Election of Fellows and Council of the National Academy of Sciences, Allahabad.
3. Member, CSIR Emeritus Scientist Committee.
4. Member, Research Council of the National Physical Laboratory, Delhi.
5. Member, Council of the Indian Statistical Institute, Kolkata.
6. Member, Governing Body of the Jagadish Bose National Talent Search (JBNSTS).
7. Member, Advisory Committee of the West Bengal University of Technology.
8. Member, Scientific Advisory Committee, Bose Institute, Kolkata.

**Visits abroad**

1. Visited Forschungszentrum Juelich under an invitation from the "Follow Up"

programme of the Alexander von Humboldt Fellowship, Germany (18 July-15 September 2002).

2. Represented the Indian National Science Academy at the meeting of the IUPAP (International Union of Pure & Applied Physics) in Berlin, Germany, during 8-12 October 2002.

**Binayak Dutta Roy****Publications**

Ram Narayan Deb, Avinash Khare and **Binayak Dutta-Roy**, (2003), Complex Optical Potentials & Pseudo-Hermitian Hamiltonians, *Physics Letters A*, 307, 215.

**Work in progress**

- Completed paper on *Squeezed Spin States & Pseudo-Hermitian Operators* (with Ram Narayan Deb and Nilkantha Nayak)
- Understanding the *Fano Resonance* (with Swarnali Bandyopadhyay and H.S. Mani)
- *Dirac Oscillator Model of Quark-Hadron Duality in Deep Inelastic Scattering* (with H.S. Mani and Pradip Roy)
- *Ultrasound Scattering from Tissues* (with Subodh Sharma).

**Debashis Gangopadhyay****Projects**

1. Continuing work in *Quantum Logic Gates* with Prof. M.N. Singha Roy of Presidency College.
2. Started a collaboration in (Statistical Field Theory) with Prof. J.K. Bhattacharya of IACS.

**Other scientific and educational activities**

R. Bhattacharyya, an external student has submitted thesis on 27.12.2002.

Taught *Quantum Field Theory* to Post B.Sc./Post M.Sc. combined class for 7 months.

Chaired a session in *National Conference on Theoretical Physics*, January 21-24, 2003 at IACS, Kolkata.

## Gautam Gangopadhyay

### Publications

1. Sumana Banerjee and **G. Gangopadhyay**, (2002), Spectra of displaced distorted oscillator molecular system, *Chem. Phys. Letts.*, 359, 295-302.
2. Dipankar Rana and **G. Gangopadhyay**, (2003), Studies on energy transfer in dendrimer supermolecule using classical random walk model and Eyring model, *J. Chem. Phys.*, 118, 434-443.
3. Sujata Paul and **Gautam Gangopadhyay**, (2003), Power law relaxation kinetics in multistep reversible reaction, *Chem. Phys. Letts.*, vol. 369, 643-64

### Conferences/Symposia/Workshops attended

Attended the *National Conference on Theoretical Chemistry*, 17-19 January 2003, at Indian Association for the Cultivation of Science, Kolkata and delivered a talk.

### Teaching programmes/Invited lectures

Lecture delivered on *Dendrimer as an artificial light harvesting system: Dynamics and Spectra* at the National Conference on Theoretical Chemistry, 17-19 January 2003, at Indian Association for the Cultivation of Science, Kolkata.

Delivered a talk on *Natural and artificial light harvesting system* on 17 February 2003 in Silchar G. C. College, Assam.

### Research guidance

Two PhD students are working on the following research projects:

1. *Theoretical spectroscopic studies on molecular vibration and electronic processes* (Sumana Banerjee).
2. *Reaction diffusion and other nonlinear dynamical processes in biology and chemistry* (Sujata Paul).

### Other educational and scientific activities

I have given a lecture on *Guidance level demonstration on chemical reaction kinetics and mechanism* at the undergraduate level to the DST sponsored KVPY students at SNBNCBS in June 2002.

## Partha Guha

### Publications

1. **P. Guha**, (2002), Applications of Nambu Mechanics in Hydrodynamical Systems, *Journal of Mathematical Physics*, 43, 4035.
2. **P. Guha**, (2002), Geometry of Kaup-Newell equation, *Reports in Mathematical Physics*, 50, 1-13.
3. **P. Guha**, (2002), Diffeomorphism with some Sobolev metric, Geodesic flow and Integrable systems, *Journal of Dynamical Systems and Control theory*, 8, 529.
4. **P. Guha**, (2002), Euler-Poincare formalism of KdV-Burgers and Higher order Nonlinear Schroedinger Equations, *Regular and Chaotic Dynamics*, No. 7, 425.
5. **P. Guha**, (2002), Generalized Poisson Mechanics in D-Brane, *International Journal of Modern Physics*, 17A, 4759-4775.
6. **P. Guha**, (2003), Moving space curve equations and a family of coupled KdV type systems, *Chaos Soliton and Fractals*, 15, 41-46.

**Teaching**

1. *Differential Equations*, Spring 2003, University of Colorado at Colorado Springs.
2. *Advanced Linear Algebra*, Spring 2003, University of Colorado at Colorado Springs.
3. *Linear Algebra*, Fall 2002, University of Colorado at Colorado Springs.
4. *Calculus 2*, Fall 2002, University of Colorado at Colorado Springs.
5. *Finite Mathematics*, Spring 2002, University of Missouri-Columbia.

**Invited research talks**

1. *AKS hierarchy and bihamiltonian geometry*, Colorado School of Mines, January 2003.
2. *Hamiltonian systems in infinite dimensional groups and integrable systems*, University of Texas-Pan American, January 2003.
3. *Geodesic flows on infinite dimensional groups and integrable systems*, University of Colorado, Colorado Springs, November, 2002.
4. *Geodesic flows on groups of area preserving diffeomorphisms and twister construction*, University of Missouri-Columbia, April 2002, PDE seminar.

**Amitabha Lahiri****Publications**

1. **A. Lahiri**, (2002), Gauge Transformations of the Non-Abelian Two-Form, *Mod. Phys. Lett. A*, 17, 1643.
2. **A. Lahiri**, (2002), Local Symmetries of the Non-Abelian Two-Form, *J. Phys. A*, 35, 8779.

**Conferences/Workshops/Symposia attended**

Organiser of *AKR80: A Tribute to Teacher and Friend* held at S. N. Bose National Centre during February 22-24, 2003.

**Teaching**

Taught a course titled *Electromagnetic Theory I* to Post BSc. integrated PhD students, Autumn 2002.

**Archan S. Majumdar****Publications**

1. **A. S. Majumdar** and D. Home, (2002), Interpreting the time of decay measurement: phenomenological significance of the Bohm model, *Phys. Lett. A*, 296, 176.
2. S. Bandyopadhyay, **A. S. Majumdar** and D. Home, (2002), Quantum mechanical effects in a time-varying reflection barrier, (2002), *Phys. Rev. A*, 65, 052718.
3. **A. S. Majumdar** and D. Home, (2002), Quantum superarrivals and information transfer through a time-varying boundary, *Pramana-J. Phys.*, 59, 321.
4. Md. Manirul Ali, **A. S. Majumdar** and D. Home, (2002), Understanding quantum superarrivals using the Bohmian model, *Phys. Lett. A*, 304, 61.
5. **A. S. Majumdar**, (2003), Domination of black hole accretion in brane cosmology, *Phys. Rev. Lett.*, 90, 031303.

**Conferences/Symposia/Workshops attended**

1. Presented an invited lecture at the 11th U.K. *Conference on Foundations of Physics*, Oxford University, U.K., September 14—18, 2002.
2. Presented an invited lecture at the 9<sup>th</sup>

*International Symposium on Particles, Strings and Cosmology*, Tata Institute of Fundamental Research, Mumbai, January 3-8, 2003.

### Talks given

1. *Quantum superarrivals and the reality of the Schroedinger wave function*, at the 11th U. K. Conference on Foundations of Physics, September 2002.
2. *Inflation and primordial black holes in brane cosmology* at S. N. Bose National Centre, December 2002.
3. *Domination of black hole accretion in brane cosmology*, at the 9th International Symposium on Particles, Strings and Cosmology, January 2003.

### Teaching & Student Supervision

1. Taught a course on *General Theory of Relativity and Cosmology* jointly with B. Chakraborty to post-M.Sc students.
2. Supervised the Summer Project of Archisman Ghosh, student of IIT Kanpur.
3. Supervising the Ph.D work of Md. Manirul Ali.

### Rudra Prakash Malik

#### Publications

1. **R. P. Malik**, (2002), Superfield approach to BRST cohomology, *J. Phys. A: Math Gen.* 35, 3711-3725.
2. **R. P. Malik**, (2002), Topological aspects of Abelian gauge theory in superfield formulation, *J. Phys. A: Math Gen.* 35, 6919-6930.
3. **R. P. Malik**, (2002), Superfield approach to topological features of non-Abelian gauge theory, *J. Phys. A: Math Gen.* 35, 8817-8830.

### Conferences/workshops/symposia attended

1. *In-house Meeting* of S. N. Bose National Centre, held at S. N. Bose National Centre for Basic Sciences, 30-31 December 2002.
2. *Indo-Italian International Workshop on Noncommutative geometry and quantum field theory* held at IMSc., Chennai, 9-15 January 2003.
3. *AKR80 : A Tribute to Teacher and Friend*, held at Jadavpur University and S. N. Bose National Centre for Basic Sciences, 22-24 February 2003.

### Talks given

1. Delivered a talk on *Supersymmetry and BRST type symmetries* at SNBNCBS on the occasion of the In-house Meeting of the Centre, December 2002.
2. Delivered an invited talk on *New symmetries for the Abelian 2-form gauge theory* at the Indo-Italian International Workshop on Noncommutative geometry and quantum field theory, January 2003.

### Other scientific and educational activities

*Teaching Programmes:* Gave a course on *Classical Mechanics* to Post M. Sc. students from August-October 2002.

*Research Guidance:* Guided a summer project student Rajyavardhan Ray (B. Sc. student) from St. Stephen's College, New Delhi in June-July 2002.

*Administrative Work:* For the last 2 years, served as a member of the Telephone and Transport Committees of SNBNCBS. Also worked as the Chairman of Maintenance Committee as well as Sports, Cultural and Gymkhana Committee.

For last 6 months, working as the coordinator for all the activities of West Bengal

University of Technology (WBUT). It is worthwhile to mention that the Post B. Sc. integrated Ph. D. programme of SNBNCBS is recognized by WBUT.

One of the judges at the Regional Science Exhibition-2002 held at Kendriya Vidyalaya, Salt Lake, in August 2002.

Involved in the selection process of the KVPY 2002 students in September 2002.

## Kalyan Mandal

### Publications

#### i) In journals

1. **K. Mandal**, S. Chakraverty, S. Pan Mandal, P. Agudo, M. Pal and D. Chakravorty, (2002), Size dependent magnetic properties of  $\text{Mn}_{0.5}\text{Zn}_{0.5}\text{Fe}_2\text{O}_4$  nanoparticles in  $\text{SiO}_2$  matrix, *Journal of Applied Physics*, 92, 501-505.
2. **K. Mandal**, T. K. Krause and D. L. Atherton, (2003), Characterization of magnetic materials by Barkhausen noise measurement, *Indian Journal of Physics*, 77A, 93-97.

#### ii) In conference proceedings

1. **K. Mandal**, S. Pan Mandal and M. Vazquez, (2002), Annealing effect on the giant magnetoimpedance of amorphous microwire, in *Proceedings of Condensed Matter Days-2002*, pg. 22.
2. **K. Mandal** and D. L. Atherton, (2002), The effects of defect depth and bending stress on magnetic flux leakage signals, in *Proceedings of NDE 2002*, pg. 104.
3. **K. Mandal**, S. Chakraverty and S. Kumar, (2003), Magnetic properties  $\text{NiFe}_2\text{O}_4\text{—SiO}_2$  nanoparticles, in *Proceedings of National Seminar on Science & Technology of Nanomaterials*, pg. 16.

4. **K. Mandal**, (2002), Use of magnetic flux leakage signals for condition monitoring of pipelines, in *Proceedings of Workshop on Reliability through NDE*, pg. 24.

### Visits, Conferences, Symposia attended

1. *Workshop on Reliability through NDE*, held at Kolkata, 20 April 2002.
2. *Condensed Matter Days-2002*, held at T. M. Bhagalpur University, Bhagalpur, 27-31 August 2002.
3. *NDE-2002, National Seminar on Non-Destructive Evaluation*, held in Chennai, 5-7 December 2002.
4. *In-House meeting 2002*, held at SNBNCBS, Kolkata, 30-31 December 2002.
5. *National Seminar on Science and Technology of Nanomaterials 2003*, held at CGCRI, Kolkata, 6-7 March 2003.

### Talks given

1. *Use of magnetic flux leakage signals for condition monitoring of pipelines at Workshop on Reliability through NDE (Kolkata, April 2002).*
2. *Annealing effect on the giant magnetoimpedance of amorphous microwire at Condensed Matter Days- 2002 (Bhagalpur, August 2002).*
3. *The effects of defect depth and bending stress on magnetic flux leakage signals at NDE-2002 (Chennai, December 2002).*
4. *Basic sciences in applied research at In-House Meeting-2002 (Kolkata, December 2002).*
5. *Magnetic properties  $\text{NiFe}_2\text{O}_4\text{—SiO}_2$  nanoparticles at National Seminar on Science & Technology of Nanomaterials-2003 (Kolkata, March 2003).*

**Other scientific and educational activities****i) Teaching**

1. *Development of a teaching laboratory*: The development of a teaching laboratory for 'Post B. Sc.-Integrated Ph. D. Programme' is going on. This year, some basic experiments on Nuclear Physics using G. M. Counter have been added. The C. K. Majumdar laboratory is now well equipped for giving training on Analog and Digital Electronics, Optics, Solid State Physics and Nuclear Physics.
2. *Theoretical classes*: Taken theoretical classes on a part of *Condensed Matter Physics* for Post M. Sc. programme and taken *Solid State Physics* and *Nuclear Physics* practical classes of first and second year students of Post B. Sc. Integrated Ph. D. programme.

**ii) Research Guidance**

*Ph. D. students* : Suvankar Chakraverty and Jayeeta Lahiri

*Summer students* : Shibaji Ghose, Nivedita Dutta and Surajit Das

**iii) Administrative Work**

1. Coordinator, Summer Programme - 2002
2. Member, Purchase Sub-Committee
3. Member, Post. Sc. Integrated Ph. D. committee
4. In-Charge, Post B.Sc. integrated Ph.D. Laboratory

**Professional honours/awards**

1. Received a project entitled *Synthesis and characterization of ferrite nanoparticles* from Department of Science and Technology, Government of India. The project has been started from June, 2002.
2. Selected for *Humboldt Research Fellowship*

by Alexander von Humboldt Foundation, Germany in March 2003.

**H. S. Mani****Publications**

**H. S. Mani** and Manu Mathur, (2002),  $SU(N)$  Coherent States, *Journal of Mathematical Physics*, 43, 5351.

**Talks given**

1. *T- violation in particle physics* at S.N. Bose Centre Kolkata in July 2002.
2.  *$SU(N)$  Coherent states* (two talks) at University of Hyderabad in October 2002.
3. *2002 Nobel prize in physics* at University of Hyderabad in October 2002.
4. Six lectures in *Mechanics* at Nuclear Science Centre, New Delhi, in November 2002.

**Subhrangshu Sekhar Manna****Publications**

1. **S. S. Manna** and P. Sen, (2002), Modulated scale-free network in Euclidean space, *Phys. Rev. E.*, 66, 066114.
2. N. I. Lebovka, **S. S. Manna**, S. Tarafdar and N. Teslenko, (2002), Percolation in models of thin film depositions, *Phys. Rev. E.*, 66, 066134.
3. **S. S. Manna**, (2002), Self-Organization in a Granular Medium by Internal Avalanches, *Phase Transitions*, 75, 529.
4. **S. S. Manna** and A. L. Stella, (2002), Self-organized random walks and stochastic sandpile: from linear to branched avalanches, *Physica A*, 316, 135-143.
5. R. Karmakar, **S. S. Manna** and T. Dutta, (2003), A geometrical model of diagenesis using percolation theory *Physica A*, 318, 113.

6. G. Mukherjee and **S. S. Manna**, (2003), Quasistatic scale-free networks, *Phys. Rev. E.*, 67, 012101.
7. P. Sen, S. Dasgupta, A. Chatterjee, P. A. Sreeram, G. Mukherjee and **S. S. Manna**, (2003), Small-world properties of the Indian railway network, *Phys. Rev. E.*, 67, 036106.

### Books

Edited with J. K. Bhattacharjee, the proceedings of the *International Conference on Statistical Physics, Statphys- Kolkata IV*, held in IACS and SNBNCBS during 14-19 January, 2002. This has been published by Elsevier, as a special issue of *Physica A*, volume 318, 2003.

### Conferences/Workshops attended

1. Attended School on *Statistical Physics, Probability Theory and Computational Complexity* followed by *Conference on Typical-case Complexity Randomness and Analysis of Search Algorithms* at ICTP, Trieste, Italy from 26 August - 7 September 2002.
2. Attended *Unconventional Applications of Statistical Physics* at Saha Institute of Nuclear Physics, 20-22 March, 2003, Kolkata.
3. Discussion Meeting on *Statistical Mechanics of Threshold Activated Systems* at Institute of Mathematical Sciences, Chennai during March 24-26, 2003.

### Invited lectures

1. University of Stuttgart, Stuttgart on *Quasistatic scale-free networks*, September 2002.
2. ICTP, Trieste, Physics Associate's meeting titled *Some recent studies on the Statistics of Networks*, September 2002.

3. *Small-world properties of the Indian Railway Network* delivered at Unconventional Applications of Statistical Physics, Saha Institute of Nuclear Physics, 20-22 March, 2003, Kolkata.
4. *Detailed balance/imbalance at the greedy sites of a quenched sandpile* delivered at Discussion Meeting on Statistical Mechanics of Threshold Activated Systems, Institute of Mathematical Sciences, Chennai, 24-26 March 2003.

### Manu Mathur

#### Publications

**Manu Mathur** and H. S. Mani, (2003),  $SU(N)$  Coherent States, *J. Math. Phys.*, 43, 5351.

#### Talks given

$SU(N)$  Coherent States, IMSc., Chennai, December 2002.

#### Other scientific and educational activities

Visited IMSc, Chennai for a month from December 2002 to January 2003.

### Anita Mehta

#### Publications

##### (i) In journals

1. **Anita Mehta** and R. A. Cowley, (2002), Epitaxial Growth of Thin Films - a Statistical Mechanical Model, *J. Phys. - Cond. Mat.*, 14, 17, 4385-4392.
2. G. C. Barker and **Anita Mehta**, (2002), Inhomogeneous relaxation in vibrated granular media: consolidation waves, *Phase Transitions*, 75, 519-528.

##### (ii) Publications in Books

1. **Anita Mehta**, Biplab Sanyal and Abhijit Mookerjee, Modelling the growth of rough



surfaces: coupled continuum equations, electronic structure and magnetic properties, pp. 280-307, in *Electronic Structure of alloys, surfaces and clusters: systems without lattice translational symmetry*, Advances in Condensed Matter Science, vol. 4, eds. A. Mookerjee and Dipankar Das Sarma, (Taylor and Francis, 2003)

### (iii) Publication of Book

*Challenges in Granular Physics*, editors Thomas C. Halsey and **Anita Mehta** (World Scientific, 2002).

### Conferences/Workshops attended

1. Plenary speaker in residence at *Workshop on Geometry and Mechanics of Structured Materials*, Max Planck Institute for the Physics of Complex Systems (MPIPKS), Dresden (29.9.2002 - 25.10.2002).
2. Session chair at *Unconventional Applications of Statistical Physics*, Kolkata, on 21 March 2003.

### Invited lectures

1. Seminar at the Laboratoire de Physique Statistique, Ecole Normale Supérieure, Paris (5 June 2002).
2. Seminar at the Service de Physique Théorique, CEA Saclay (24 June 2002).
3. Focus week talk at Workshop on *Geometry and Mechanics of Structured Materials*, Max Planck Institute for the Physics of Complex Systems (MPIPKS), Dresden (1 October 2002).
4. Workshop week talk at *Workshop on Geometry and Mechanics of Structured Materials*, Max Planck Institute for the Physics of Complex Systems (MPIPKS), Dresden (23 October 2002).

5. Chairperson and discussion leader of *Working Group on Compaction at Workshop on Geometry and Mechanics of Structured Materials*, Max Planck Institute for the Physics of Complex Systems (MPIPKS), Dresden (14-19 October 2002).
6. Seminar at Laboratoire de Physique Théorique, University of Strasbourg (21 October 2002).

### Other scientific and educational activities

1. Representative Speaker for Statistical Physics Group of S. N. Bose National Centre, at DST Review Panel (2002).
2. Visiting Professor at Service de Physique Théorique, CEA Saclay, (June 2002).
3. Visiting Professor at Ecole Normale Supérieure, Paris (May 2002).
4. Associate of International Centre of Theoretical Physics, Trieste.
5. Member of Board of Editors for *Granular Matter*, (Springer-Verlag, Heidelberg).
6. Thesis Referee for Tamas Kustanovich-Flor, Weizmann Institute, Israel (2002).
7. Member of National Selection Committee for Rhodes Scholarships, New Delhi (January 2003).

### Anilesh Mohari

#### Publications

1. **A. Mohari**, (2003), Markov-shift in non-commutative probability, *Journal of Functional Analysis*, 199, 189-209, Academic Press-Elsevier Science.
2. **A. Mohari**, (2003), Ergodicity of homogeneous Brownian flows, *Stochastic Processes and their application*, 105, 99-116, *Elsevier Science*.

## Abhijit Mookerjee

1. A. Ray, P. Das, S.K. Saha, S.K. Das and **A. Mookerjee**, (2002), Effect of host medium on the L/K ratio in  $^7\text{Be}$  electron capture, *Phys. Rev. C*, 66, 012401.
2. Biplob Ganguli and **A. Mookerjee**, (2002), Optical properties of III-V semiconducting alloys, *Int. J. Mod. Phys.*, B16, 3681.
3. D. Paudyal, T. Saha-Dasgupta and **A. Mookerjee**, (2003), Phase stability of NiPt alloys, *J. Phys. Condens Matter*, 15, 1029.
4. **A. Mookerjee**, T. Saha-Dasgupta, I. Dasgupta, A. Arya, S. Banerjee and G.P. Das, (2003), A first-principles thermodynamic approach to ordering in binary alloys, *Bull. Mat. Sci.*, 26, 79.
5. Ashish Bhattacharjee, M. Ahmed, **A. Mookerjee** and A. Halder, (2003), Effect of alloying on the electronic and magnetic properties of Fe, Co and Ni with Au and Ag, *Bull. Mat. Sci.*, 26, 90.
6. A. Banerjee, R.P. Datta, **A. Mookerjee** and A.K. Bhattacharya, (2003), Simulated annealing studies of small Cu Clusters, *Int. J. Mod. Phys. B*, 17, 273.
7. M. Kabir, **A. Mookerjee**, R.P. Datta, A. Banerjee and A.K. Bhattacharya, (2003), An ab-initio full-potential muffin-tin orbitals based molecular dynamics study of small Cu Clusters, *Int. J. Mod. Phys. B*, 17, 2061.
8. A. Huda, M. Ahmed, A. Halder and **A. Mookerjee**, (2003), Effect of alloying on the electronic and magnetic properties of AuFe, AgFe and CuFe, *Int. J. Mod. Phys. B*, 17, 281.

## Talks given

1. *First principles thermodynamics of alloy systems*: National Science Academy Meeting, NEHU, Shillong.

2. *Study of materials from first principles*: Physics Department, Viswabharati University, Shantiniketan.
3. *Perspectives in the study of materials*: DST Meet on Condensed Matter, University of Pune.

## Projects

1. *Study of clusters and their interaction with surfaces* : with Prof. A.K. Bhattacharya, University of Warwick, U.K. (funded by Warwick University)
2. *Study of Electronic Structure of Metals and Alloys* : with Prof. M. Ahmed, University of Dhaka, Bangladesh (funded under the Network Project, ICTP, Trieste)

## Other scientific and educational activities

1. Taught *Quantum Mechanics* to M.Sc. Part II students at Presidency College, Kolkata.
2. Taught various courses in the Centre's Post B.Sc. integrated Ph.D. Programme.

## Administration

Acted as the *Dean (Academic Programme)* throughout the year.

## Sugata Mukherjee

### Publications

S.N. Behera, B.K. Panda, **S. Mukherjee** and P. Entel, (2002), A comparison of different orthogonal tight-binding molecular dynamics simulation methods for silicon clusters, *Phase Transitions*, Vol. 75, pp. 41-50.

### Courses given

*Condensed Matter Theory* for Post-M.Sc. students, November 02-March 03.

## Other scientific and educational activities

1. Convener of M.Phil. thesis examination at Dhaka University.

2. Co-convener of Theoretical Physics Seminar Circuit (TPSC).

## Pratip Kumar Mukhopadhyay

### Publications

**P. K. Mukhopadhyay** and D. Das, (2003), Sound velocity study of Ni-Mo systems, *Indian Journal of Physics*, 77A (2), 159-162.

### Visits, conference and symposia attended

1. Attended the *Condensed Matter Days, 2002* in the Department of Physics, T. M. Bhagalpur University, from 28-32 August 2002.
2. Visited IIT Kanpur in March 2003 in connection with preparation of samples.

### Talks given

1. Gave an oral presentation at the *Condensed Matter Days, 2002* in the Department of Physics, T. M. Bhagalpur University, from 28-32 August 2002.
2. *Activities in LCMP* talk given in the In-House meeting at SNBNCBS, 30-31 December 2002.

### Other scientific and educational activities

1. The project on sound velocity and attenuation is going on. An R.A. has been appointed.
2. A new work on Biomimetic nano particles was presented in a national level conference.
3. A collaborative work on soft nano ferrites is underway.

## Nilakantha Nayak

### Research interests

Quantum Optics, Laser Physics, Multiwave

Mixing, Foundations of Quantum Mechanics, and Quantum Thermodynamics.

### Publications

1. A. S. Majumdar and **N. Nayak**, (2002), Effects of decoherence in entangled atomic wavefunctions in microcavities, *Foundations of Quantum Mechanics in the Light of New Technology*, edited by Y. A. Ono and K. Fujikawa (World Scientific, 2002), pp.152-155.
2. **N. Nayak**, (2002), Maser and laser action with one atom in proceedings of the Sixth International Conference on Optoelectronics, Fiber Optics and Photonics, December 16-18, 2002, TIFR.

### Ongoing projects

1. *Quantum heat engines* (with the group of Professor Marlan O. Scully at the Texas A & M University, College Station, USA)
2. *Dark resonances in a Raman system with an additional microwave field* (with the group of Professor Marlan O. Scully at the Texas A & M University, College Station, USA)
3. *Squeezing and nonclassical fields in lasers pumped with atoms in coherent states* (independently)
4. *Spin squeezing* (with the group of Professor Paul Berman at the University of Michigan, Ann Arbor, USA)
5. *Spin squeezing in Schwinger representation* (with Professor B. Dutta-Roy and R. N. Deb)

### Conference attended

Attended the Sixth International Conference on Optoelectronics, Fiber Optics and Photonics (PHOTONICS 2002) held at the TIFR, Mumbai during 16-18 December 2002.

**Talks given**

Presented our paper *Towards Schwinger representation of spin squeezing* at the In-House Meeting - II of the Centre held on 30-31 December 2002.

**Other scientific and educational activities**

Gave a course on *Quantum Mechanics* for one semester to post M. Sc. students (2002-03) of the Centre.

**Samir K. Paul****Ongoing Projects**

1. *Resolving singularities of quotient variety* (with Siddhartha Sen, IACS, Kolkata and School of Mathematics, Dublin, Ireland).
2. *Perturbed conformal field theory* (with Anjan Kundu, SINP, Kolkata)
3. *Coherent states for non-compact groups* (with Manu Mathur, SNBNCBS, Kolkata)
4. *Lie algebraic formulation of Feronions on lattice and solvability of a certain class of Hamiltonians* (with Jaydeb Chakraborty, IACS, Kolkata)
5. *Some exact results of Ising models on periodic and aperiodic lattices in two dimensions* (with Susanta Bhattacharya, RS College, Howrah).

**Talks given**

1. Two invited talks given on *Canonical Transformations in Classical Mechanics* in the UGC sponsored Refresher Course in Mathematics for College and University Teachers during November 13 - December 4, 2002 in the Department of Mathematics, Calcutta University.
2. Presented a resume on *Resolved singular hypersurface  $\{x_0\}\{x_{-1}\}-\{\{x_{-2}\}^n\} = 0$  and the classical phase space of the Lie group  $SU(n)$*  in

the Inhouse Meeting (SNBNCBS) during December 2002.

**Other scientific and educational activities**

1. Taught *Methods of Mathematical Physics* in the post M.Sc. classes during August 2002-October 2002 in the 2002-2003 session.
2. Member of Post-M.Sc. teaching committee.

**Tanusri Saha Dasgupta****Publications****(i) In journals**

1. **T. Saha-Dasgupta** and S. Satpathy, (2003), Wannier-like functions and tight-binding parametrization for the manganese bands in  $\text{CaMnO}_3$ , *J. Phys. (Condens. Matter)*, vol 15, 1685.
2. Durga Paudyal, **Tanusri Saha-Dasgupta** and Abhijit Mookerjee, (2003), Study of phase stability in NiPt systems, *J. Phys. (Condens. Matter)*, vol 15, 1029.
3. **T. Saha-Dasgupta** and R. Valenti, (2002), Comparative study between two quantum spin systems  $\text{KCuCl}_3$  and  $\text{TlCuCl}_3$ , *Europhys. Lett.*, vol 60, 309.
4. V. V. Mazurenko, A. I. Lichtenstein, M. I. Katsnelson, I. Dasgupta, **T. Saha-Dasgupta**, and V. I. Anisimov, Nature of insulating state in  $\text{NaV}_2\text{O}_5$  above charge-ordering transition- A cluster dynamical mean-field study, *Phys. Rev. B*, 66, *Rapid Commun.*, 081104 (R).
5. R. Valenti, **T. Saha-Dasgupta** and C. Gros, (2002), Nature of the spin-singlet ground state in  $\text{CaCuGe}_2\text{O}_6$ , *Phys. Rev. B*, 66, 054426.

**(ii) In conference proceedings**

1. O. K. Andersen, **T. Saha-Dasgupta** and S. Ezhov, (2003), Third-generation muffin-tin orbitals, *Bull. of Mater. Sci.*, vol 26, 19.

2. D.Nguyen-Manh, **T. Saha-Dasgupta** and O. K. Andersen, (2003), Tight-binding model for carbon from the third-generation LMTO method: A study of transferability, *Bull. of Mater. Sci.*, vol 26, 27.

### (iii) Books

1. D. D. Sarma, N. Shanthi and **T. Saha-Dasgupta** (2003), Estimation of electronic interaction strengths from *ab-initio* calculations, *Electronic Structure of Alloys, Surfaces and Clusters* ed. A. Mookerjee and D. D. Sarma, Advances in Condensed Matter Sciences, vol 4, Taylor and Francis, pg 261-279.
2. **T. Saha-Dasgupta** and A. Finel (2003), Equilibrium and non-equilibrium statistical mechanics of alloys in Fcc lattice, *Electronic Structure of Alloys, Surfaces and Clusters* ed. A. Mookerjee and D. D. Sarma, Advances in Condensed Matter Sciences, vol 4, Taylor and Francis, pg 230-260.

### Invited talks at conferences

1. *DST interaction meeting* at University of Pune, Pune in March, 2003. *Talk: First-principles study of low-dimensional compounds.*
2. *In-house meeting* at SNBNCBS in December 2002. *Talk: Low-dimensional quantum spin systems.*
3. *Realistic Theories of Correlated Electron Materials* at Kavli Institute for Theoretical Physics, Santa Barbara in September 2002. *Talk: Minimal local-orbital sets in NMTO: few examples.*
4. *Conference on Electronic Structure* at Ringberg, Germany in June 2002. *Talk: Electronic Structure using NMTO method.*

### Other scientific and educational activities

1. Visiting scientist, Kavli Institute of Theoretical Physics, Santa-Barbara, USA. August – October 2002.
2. Guest scientist, Physics Department, University of Missouri, Columbia, USA. November, 2002.

### M. Sanjay Kumar

#### Other scientific and educational activities

Taught *Atomic and Molecular Physics* course to post-B.Sc. students, during July – December 2002.

### Surajit Sengupta

#### Publications

##### (a) In journals

1. W. Strepp, **S. Sengupta**, and P. Nielaba, (2002), Phase transitions of soft disks in external periodic potentials: A Monte Carlo study, *Phys. Rev. E*, 66, 056109.
2. A. Chaudhuri, P. A. Sreeram and **S. Sengupta**, (2002), Growing Smooth Interfaces with Inhomogeneous Moving External Fields: Dynamical Transitions, Devil's Staircases, and Self-Assembled Ripples, *Phys.Rev. Lett.*, 89, 176101.

##### (b) In conference proceedings

1. Abhishek Chaudhuri and **Surajit Sengupta**, (2003), Profile-driven interfaces in 1+1 dimensions: periodic steady states, dynamical melting and detachment, *Physica A*, 318, 30.
2. **Surajit Sengupta** and Madan Rao, (2003), Statistical mechanics of nucleation in solids: a kinetics driven morphological transition, *Physica A*, 318, 251.

**Conferences/Workshops/Symposia attended**

1. Attended *Liquid Matter Conference*, Konstanz, October 2002 as a participant.
2. Organised *India and Abroad: A Conference in Condensed Matter*, Kolkata, January 2003.
3. Attended *Protein Association and Aggregation 2003*, Mumbai, February 2003, as an invited speaker.

**S. K. Sharma****Publications**

1. J. J. Joshi, H. S. Shah, **S. K. Sharma** and R. V. Mehta, (2002), Scattering characteristics of small particles in resonance region: Effect of shape, *Indian Journal of Pure and Appl Phys.*, 40, 421-429.

**Conferences/Workshops/Symposia attended**

1. *Role of scattering approximations in ultrasound and optical tissue characterization*, talk given at one-day Seminar on *Trends in Medical Imaging and Image Processing* at Saha Institute of Nuclear Physics, Calcutta on 29 November 2002.

**Talks given**

1. *Physics of ultrasound propagation I, Microelectronics Group*, Saha Institute of Nuclear Physics, 6 September 2002.
2. *Physics of ultrasound propagation II, Microelectronics Group*, Saha Institute of Nuclear Physics, 15 November 2002.
3. *Studies on light propagation in biomedical tissues*, in In-house meeting, 30-31 December 2002.

**Ongoing projects**

1. *Role of light scattering in biomedical tissue characterization* (with Dr. Srilekha Banerjee of the Centre).

2. *Role of ultrasound scattering in biomedical tissue characterization* (with Professor Swapan K Sen of Saha Institute of Nuclear Physics).
3. *Inversion methods in light scattering* (with Dr. Ashim Roy of Indian Statistical Institute, Calcutta).
4. *Effective medium theories* (with Professor A R Jones, Imperial College, London).

**P. Singha Deo****Conferences/Workshops/Symposia attended**

*Minerva meeting of young researchers: semiclassicals, quantum chaos and mesoscopics* at Max Planck Institute for the Physics of Complex Systems, Dresden, Germany, from January 29 to February 2, 2003. Presented poster titled *Friedel sum rule and Fano resonances*.

**Talks given**

1. *Deformed electronic states in mesoscopic systems* at RRI, Bangalore in May, 2002.
2. *Topics in mesoscopic physics* at SINP, Calcutta in July 2002.

**Other scientific and educational activities**

Taught two courses and supervising a Ph.D student, Swarnali Bandopadhyay.

**P. A. Sreeram****Research & development programme/projects**

1. *Quantum treatment of Anderson-Hasegawa model for rare-earth manganites* (with Prof. S. Dattagupta and Dr. Manidipa Mitra).
2. *Study of a moving interface in a non-uniform field* (with Dr. Surajit Sengupta and Mr. Abhishek Choudhury).

3. *Small world network properties of the Indian Railways* (with Dr. P. Sen, Dr. S. S. Manna, Dr. Subinay Dasgupta, A. Chatterjee and G. Mukherjee).

### **Publications**

1. A. Chaudhuri, **P. A. Sreeram**, and S. Sengupta, (2002), Growing Smooth Interfaces with Inhomogeneous Moving External Fields: Dynamical Transitions, Devil's Staircases and Self-Assembled Ripples, *Phys. Rev. Lett.*, 89, 176101.
2. P. Sen, S. Dasgupta, A. Chatterjee, **P. A. Sreeram**, G. Mukherjee, and S. S. Manna, (2003), Small-world properties of the Indian railway network, *Phys. Rev. E*, 67, 036106.
3. Manidipa Mitra, **P. A. Sreeram**, and Sushanta Dattagupta, (2003), Polaronic heat capacity in the Anderson-Hasegawa Model, *Phys.Rev. B*, 67, 132406.

### **Conference/Symposia/Workshops attended**

1. *Workshop on Parallel & Grid Computing*, March 2002.
2. Participant in *India and Abroad III : A Conference on Condensed Matter Physics*, January 2-4, 2003.
3. Local organizer, *National Symposium on Colossal Magnetoresistance in Rare-earth Manganites*, January 7-10, 2003.

### **Teaching Programmes and Invited Lectures**

1. Invited to give a lecture on *Smoothing of interfaces by inhomogeneous, moving fields : Dynamical transitions and Devil's staircases*, at Institute of Physics, Bhubaneswar on September 3, 2002 as part of Alumni Association function.
2. Lecture course on *Numerical Methods* to Post-M. Sc students in S. N. Bose National Centre for Basic Sciences, Kolkata.

## II. Research Associates

### Sumita Datta

#### *Publications*

1. J. M. Rejcek, **S. Datta**, N. G. Fazleev and J. L. Fry, (2002), Application of the Feynman-Kac path integral method in finding excited states of quantum systems, *Computer Physics Communications*, 146, 154-165.
2. **S. Datta** and J. K. Bhattacharjee, (2003), A self consistent technique for singular potentials, *Eur. Phys.J. B*, 31, 247-248.

#### *Poster presentation*

1. A poster on *Computing finite properties of quantum many body system* was presented in the conference *India and Abroad- III* in January 2-4, 2003 at SNBNCBS.
2. A poster on *Nodal structure and symmetry properties of quantum mechanical system* was presented in a *National Conference on Theoretical Physics* in January 21-24, 2003, at IACS.

### Uday Kumar

#### *Projects*

Material and samples are prepared. Experimental studies (XRD, AC susceptibility, sound velocity

and internal friction, SEM) are carried out.

#### *Visits*

For some experimental work, visited Department of Physics, IIT Kanpur at the end of March 2003. Papers are in progress.

### Manidipa Mitra

#### *Publications*

1. **Manidipa Mitra**, P. A. Sreeram and Sushanta Dattagupta, (2003), Polaronic heat capacity in the Anderson-Hasegawa model, *Phys. Rev B*, Vol.67, pp 132406.

#### *Conferences/Workshops/Symposia attended*

Participated in the *National Conference on Colossal Magnetoresistance Material* held at S. N. Bose National Centre for Basic Sciences from 7-10 January 2003.

#### *Talks given*

1. *Polaronic heat capacity in the Anderson-Hasegawa model*, in the In-House Meeting, S. N. Bose National Centre for Basic Sciences, on 31 December 2002.
2. *Magnetic transition and polaron crossover in a double exchange system* at National Conference on Colossal Magnetoresistance Material, held at S. N. Bose National Centre for Basic Sciences on 9 January 2003.



### III. Students

**Aftab Alam** – Jr. Research Fellow

*Supervisor : Prof. Abhijit Mookerjee*

#### Talks given

Gave a talk on *Application of Augmented Space Formalism on Photons in Random Binary Alloys* at the In House Meeting held at SNBNCBS during 30-31 December 2002.

**Md. Manirul Ali** – Jr. Research Fellow

*Supervisor: Dr. Archan S. Majumdar*

#### Publications

Archan S. Majumdar, Dipankar Home and **Md. Manirul Ali**, (2002), Understanding Quantum Superarrivals using the Bohmian model, *Phys. Lett. A*, 304, 61.

#### Conferences attended

Participated in *National Conference on Theoretical Physics (TP-2003)* held at IACS, Kolkata in 21-24 January, 2003.

**Swarnali Bandopadhyay** – Sr. Research Fellow

*Supervisor : Dr. P. Singha Deo*

#### Publications

1. P. Singha Deo, **Swarnali Bandopadhyay**, Sourin Das, (2002), Scattering phase shifts in quasi-one-dimension, *International Journal of Modern Physics B*, volume 16, No. 16, Pages 2247-2277.
2. C. Benjamin, **S. Bandopadhyay**, A. M. Jayannavar, Survival of  $Q_0/2$  periodicity in presence of incoherence in asymmetric Aharonov-Bohm rings, (2002), *Solid State Communication*, volume 124, issue 9, Pages 331-334.

#### Conferences/Workshops/Symposia attended

Participated in *India and Abroad-Condensed Matter-III*, held in S.N.B.N.C.B.S. in 2-4 January, 2003.

#### Talks/Poster presentation

1. Presented a talk on *Revisiting the Friedel Sum Rule for single channel quantum wire* in the In-house Meeting-II held in S.N.B.N.C.B.S. on 31 December 2002.
2. Presented a poster on *Revisiting the Friedel Sum Rule for single channel quantum wire* on 3-4 January 2003 in IACM-III, held in S.N.B.N.C.B.S., Kolkata.

#### Other scientific and educational activities

From 23 April 2002 to 11 May 2002 visited IOP, Bhubaneswar to work with Prof. Arun Jayannavar on (i)magnetoconductance & (ii) nonlocal conductance in Aharonov-Bohm ring.

**Sumana Banerjee** – Sr. Research Fellow

*Supervisor : Dr. Gautam Gangopadhyay*

#### Publications

1. **Sumana Banerjee** and Gautam Gangopadhyay, (2002), Spectra of displaced distorted oscillator molecular system, *Chemical Physics Letters*, vol. 359, 295-302.

#### Poster presentation

1. Presented a poster entitled *Quantum beat in pump-probe signal of molecular system*, in Trends in Theoretical Chemistry-2002 (TTC-02) at Indian Association for the Cultivation of Science, from 17-19 January 2003.
2. Presented a poster entitled *Quantum beat in pump-probe signal of molecular system*, in fifth National Symposium on Radiation and Photochemistry, at IIT Kanpur, from 3-5 March 2003.

**Monodeep Chakraborty – Jr. Research Fellow**

*Supervisor: Prof. Abhijit Mookerjee*

*Paper communicated*

**Monodeep Chakraborty**, Abhijit Mookerjee and Ashok K. Bhattacharya, (2003), Electronic structure and magnetism of Nickel thin films, *Journal of Magnetism and Magnetic Material*.

**Suvankar Chakraverty – Sr. Research Fellow**

*Supervisor : Dr. Kalyan Mandal*

*Conferences attended/Poster presentation*

1. Presented poster in RCDP 2002, held in Hyderabad University, in November 2002.
2. Participated in *India and Abroad: A Conference on Condensed Matter-III*, held in S.N.B.N.C.B.S. in 2-4 January 2003.

*Talks given*

Presented a talk on *Magnetic Properties of Ferrite Nano-Composites* in the In-house Meeting-II held in S.N.B.N.C.B.S. on 31 December 2002.

**Abhishek Chaudhuri – Jr. Research Fellow**

*Supervisor : Surajit Sengupta*

*Publications*

*(i) In journals*

1. **Abhishek Chaudhuri**, P. A. Sreeram and Surajit Sengupta, (2002), Growing smooth interfaces with inhomogeneous, moving external fields : dynamical transitions, devil's staircases and self-assembled ripples, *Physical Review Letters (PRL)*, Volume 89, 176101.

*(ii) In proceedings*

1. **Abhishek Chaudhuri** and Surajit Sengupta, (2003), Profile driven interfaces in 1+1 dimensions : periodic steady states, dynamic melting and detachment, *Physica A* 318, 30-39, as *conference proceedings of Statphys - Kolkata IV*.

*Conferences/Workshops/Symposia attended*

1. Participated in the conference *India and Abroad - III : A Conference on Condensed Matter Physics*, 2-4 January, 2003, S.N.B.N.C.B.S., Kolkata.
2. Participated in the *Workshop on practicals of Parallel Computing in the Physical Sciences*, March 27-30, 2003, Bangalore.

*Talks given*

Presented a talk in the In-house Meeting, 2002, S.N.B.N.C.B.S., Kolkata titled *Growing smooth interfaces with inhomogeneous, moving external fields : dynamical transitions, devil's staircases and self-assembled ripples*.

**Debasish Chaudhuri – Jr. Research Fellow**

*Supervisor: Dr. Surajit Sengupta*

*Publications*

Abhishek Dhar and **Debasish Chaudhuri**, (2002), Triple minima in Free Energy of Semiflexible Polymers, *Physical Review Letters*, 89, 065502.

*Conferences/Workshops/Symposia attended*

1. Participated in the conference, *India and Abroad Condensed Matter-III* from 2-4 January 2003 at S.N.B.N.C.B.S., Kolkata.
2. Participated in the *Workshop on Practicals of Parallel Computing in the Physical Sciences*, 27-30 March 2003, Bangalore.

**Talks given**

Presented a talk titled *Hard disk near hard wall: Is there a hexatic wetting layer ?* in the In House Meeting-II held in S.N.B.N.C.B.S., on 30 December 2002.

**Santabrata Das – Sr. Research Fellow**

**Supervisor: Prof. Sandip K. Chakrabarti**

**Publications****(i) In journals**

Sandip K. Chakrabarti, P. Goldoni, P. J. Wiita, Anuj Nandi and **Santabrata Das**, (2002), On the Ejection Mechanism of Bullets in SS 433, *Astrophys. J.*, 576, L45.

**Conferences attended**

1. Attended *Fourth Microquasar Workshop*, 27 May - 2 June, 2002, Cargese, Corsica, France.
2. Visited Service d'Astrophysique of CEA, CEA/DSM/DAPNIA, CEA-Centre de Saclay, 91191, Gif-sur-Yvette CEDEX, from 2 June - 8 June 2002.
3. Attended *Summer School on Astroparticle Physics and Cosmology* from 17 June to 5 July 2002, ICTP, Trieste, Italy.
4. Attended *Districtwise Space Science Symposium* on 2 January 2003, Panshkura, Midnapore, West Bengal.

**Talks/Poster presentations**

1. Presented a poster entitled *Parameter Space for Accretion flows around black holes: effects of energy dissipation* in the Fourth Microquasar Workshop, 27 May to 2 June 2002, Cargese, Corsica, France.
2. Presented a talk at SISSA entitled *Standing shocks around black holes and estimation of outflow rates* on June 27, 2002, Trieste, Italy.

3. Presented a talk at In-House Meeting - II entitled *Shocks in dissipative accretion flow* on 31 December 2002, Kolkata, India.

**Ain-ul Huda – Sr. Research Fellow**

**Supervisor : Prof. Abhijit Mookerjee**

**Publications**

1. **Ain-ul Huda**, M. Ahmed, A. Halder and A. Mookerjee, (2003), Effect of Alloying on the Electronic Structure and Magnetic Properties of AgFe, AuFe and CuFe, *Int. Jour. Mod. Phys. B*, Vol 17(3), 281.

**Mukul Kabir – Jr. Research Fellow**

**Supervisor : Prof. Abhijit Mookerjee**

**Publications**

**Mukul Kabir**, Abhijit Mookerjee, R. P. Datta, Amitava Banerjea and A. K. Bhattacharya, (2003), Study of small metallic nanoparticles : An ab-initio full-potential muffin-tin orbitals based molecular dynamics study of small Cu cluster, *International Journal of Modern Physics B*, 17, 2061-2075.

**Conferences/Workshops/Symposia attended**

1. Participated in *India and Abroad: Condensed Matter-III*, held in S.N.B.N.C.B.S., Kolkata in 2-4 January, 2003.

**Talks given**

Presented a talk on *Structure and stability of copper clusters* in the In-house Meeting-II held in S.N.B.N.C.B.S., on 31 December, 2002.

**Rumani Karmakar – Sr. Research Fellow**

**Supervisor: Prof. S. S. Manna**

**Publications**

**R. Karmakar**, S. S. Manna and T. Dutta, (2003), A geometrical model of diagenesis using percolation theory, *Physica A*, 318, 113.

**Conference attended**

1. Attended the *International Conference on Unconventional Applications of Statistical Physics* (UASP03) at SINP, Kolkata during 20-22 March, 2003.
2. Attended the *In-house Meeting II* at S. N. Bose National Centre for Basic Sciences during 30-31 December, 2002.

**Talks/Poster presentations**

1. Presented a poster entitled *Persistence distribution in sandpile model*, in the International Conference on Unconventional Applications of Statistical Physics (UASP03) at SINP, Kolkata during 20-22 March 2003.
2. Presented a talk on *Persistence distributions in Fixed Energy Sandpile* in the In-house Meeting II at S. N. Bose National Centre for Basic Sciences during 30-31 December 2002.

**Kuldeep Kumar – Jr. Research Fellow**

**Supervisor : Dr. Rabin Banerjee**

**Talks**

Gave a talk on *Open Membranes and Noncommutativity of Boundary Coordinates* in In-house Meeting in December 2002.

**Other scientific and educational activities**

Completed Post MSc. course work.

**Sivakumar G. Manickam – Sr. Research Fellow**

**Supervisor : Dr. Sandip K. Chakrabarti**

**Publications**

1. S.K. Chakrabarti, A. Nandi & **S.G. Manickam**, (2002), Relation of Light Curve Behaviour with Accretion Rates in Black Hole Candidate GRS 1915+105,

*Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2209.

2. S.K. Chakrabarti, **S.G. Manickam**, A. Nandi & A.R. Rao, (2002), Understanding Galactic Black Hole Candidate GRS 1915+105, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2279.
3. S.K. Chakrabarti, A. Nandi & **S.G. Manickam**, S. Mandal & A.R. Rao, (2002), Spectral Signature of Mass Loss from (and Mass Gain by) an Accretion Disk around a Black Hole, *Astrophysical Journal Letters*, 579, L21.

**Talks given**

Quasi-Periodic Oscillations is the X-ray emission from Black Hole Candidates, 25 March 2003 in HRI.

**Soumen Mondal – Jr. Research Fellow.**

**Supervisor : Prof. Sandip K. Chakrabarti.**

**Conferences/Workshops/Symposia attended**

1. Attended the *Districtwise Space Science Symposium* at Paskura, Midnapur, West Bengal on 2 January 2003.
2. Attended *AKR80 Conference* at the Presidency College, Jadavpur University and S. N. Bose National Centre from 21-24 February 2003.

**Talks given**

Presented a talk at In-House Meeting-II entitled *General relativistic bondi flow onto a black hole* on 31 December 2002, Kolkata, India.

**Anuj Nandi – Sr. Research Fellow**

**Supervisor : Prof. Sandip K. Chakrabarti**

**Publications****i) In journals**

1. Sandip K. Chakrabarti, P. Goldoni, Paul J. Wiita, **Anuj Nandi** and Santabrata Das,

(2002), On the Ejection Mechanism of Bullets in SS433, *Astrophysical Journal*, 576L, 45.

2. Sandip K. Chakrabarti, **Anuj Nandi**, Sivkumar G. Manickam, Samir Mandal and A. R. Rao (2002), Spectral Signature of Mass Loss from (and Mass Gain by) an Accretion Disk around Black Hole, *Astrophysical Journal*, 579L, 21.

### ii) In conference proceedings

1. Sandip K. Chakrabarti, **Anuj Nandi** and Sivkumar G. Manickam, (2002), Relation of Light Curve Behaviour with Accretion Rates in Black Hole Candidate GRS 1915+105 in *proceedings of IX Marcel Grossmann Meeting*, V.G. Gurzadyan, R.T. Jantzen and R. Ruffini (Eds.) (World Scientific, Singapore), p. 2209.
2. Sandip K. Chakrabarti, Sivkumar G. Manickam, **Anuj Nandi** and A. R. Rao, (2002), Understanding Galactic Black Hole Candidate GRS 1915+105 in *proceedings of IX Marcel Grossmann Meeting*, V.G. Gurzadyan, R.T. Jantzen and R. Ruffini (Eds.) (World Scientific, Singapore) p.2279.

### Visits/Conferences/Symposia attended

1. Attended the International Conference entitled *Fourth Microquasar Workshop*, 27 May to 1 June 2002, Cargese, Corsica, France.
2. Attended the *Summer School on Astroparticle Physics and Cosmology*, 17 June - 5 July 2002, ICTP, Trieste, Italy.
3. Attended the *Districtwise Space Science Symposium* on 2 January 2003, Pashkura, Midnapore, West Bengal.
4. Attended the *Regional Workshop for Asia-Pacific Astronomers*, 13-14 January, 2003, Udaipur, India.

### Talks/Poster presentations

1. Presented a talk at the International Conference Fourth Microquasar Workshop entitled *The outflows and jets in microquasars: the TCAF paradigm*, 27 May to 1 June 2002.
2. A poster was presented at the International Conference Fourth Microquasar Workshop entitled *Ejection of inner accretion disk in microquasars: magnetised TCAF (MTCAF) model*, 27 May to 1 June 2002.
3. Presented a talk at SISSA, Trieste, Italy entitled *Some interesting aspects of the Microquasar GRS 1915+105*, 27 May to 1 June 2002.
4. Presented a talk at In-House Meeting - II entitled *X-ray properties of SS433*, 31 December 2002, Kolkata.

### Durga Paudyal – Sr. Research Fellow

*Supervisor : Prof. Abhijit Mookerjee and Dr. Tanusri Saha Dasgupta*

### Publication

**Durga Paudyal**, Tanusri Saha-Dasgupta and Abhijit Mookerjee, (2003), Study of phase stability in NiPt systems, *J. Phys.: Condens. Matter*, 15, 1029-1046.

### Seminars attended

Presented a paper on *Study of phase stability in NiPt systems* in In-House Meeting - II during 30-31 December, 2002 at SNBNCBS, Kolkata.

### Poster presentation

Presented a poster on *Study of phase stability in NiPt systems* in India and Abroad - III Conference on Condensed Matter Physics during January 2 - 4, 2003 at SNBNCBS, Kolkata.

**Sujata Paul – Sr. Research Fellow***Supervisor – Dr. Gautam Gangopadhyay***Publications**

**Sujata Paul** and Gautam Gangopadhyay, (2002), Power law relaxation kinetics in multi step reversible reaction, *Chemical Physics Letters*, vol. 369, 643-649.

**Conferences/Poster presentation**

Presented a poster entitled *Power law kinetics in reversible enzyme-catalyzed reaction due to diffusion*, in Trends In Theoretical Chemistry-2002(TTC-02) at Indian Association for the Cultivation of Science, from 17 - 19 January 2003.

**Dipankar Rana – Sr. Research Fellow***(External)**Supervisor: Dr. Gautam Gangopadhyay***Publications**

**Dipankar Rana** and Gautam Gangopadhyay, (2003), Studies on Energy transfer in dendrimer supermolecule using classical random walk model and Eyring Model, *Journal of Chemical Physics*, Vol. 118, No. 1, P. 434.

**Kamal K. Saha – Sr. Research Fellow***Supervisor: Professor Abhijit Mookerjee***Seminar/poster presentation**

1. Presented poster at the Eleventh International Workshop on Computational Physics and Material Science : Total Energy and Force Methods, ICTP, Italy, 16 - 18 January 2003, entitled *Electronic and Optical Properties of Alloys and Compounds*.
2. Presented a talk entitled *Development of a Formalism to Study Optical Properties of Disordered Materials* at the ICTP Winter

College on Numerical Methods in Electronic Structure Theory, 16 January - 4 February 2003.

3. Visited Max-Planck Institute, Stuttgart, Germany, 5 - 21 February, 2003.

**Tomy Scaria – Sr. Research Fellow***Supervisor : Dr. Rabin Banerjee***Publications**

Tomy Scaria and **Biswajit Chakraborty**, (2002), Wigner's little group as a gauge generator in linearized Gravity theories, *Classical and Quantum Gravity*, vol.19, 4445-4462.

**Ankush Sengupta – Jr. Research Fellow***Supervisors : Surajit Sengupta and Abhijit Mookerjee***Conferences/Workshops/Symposia attended**

1. Attended the *AKR80 Conference*, 2003 at Presidency College and S.N.B.N.C.B.S., Kolkata.
2. Participated in the fifth SERC School in Condensed Matter Physics and Material Science on *The Physics of Disordered Systems*, I.M.Sc., Chennai, 2003.

**Talks given**

1. Presented a Project talk titled *QUASICRYSTALS* at the end of the project on Quasicrystals done under Dr. Surajit Sengupta in 2002.
2. Presented a talk on the same topic at the SERC School, I.M.Sc., Chennai, 2003.

**Other educational activities**

Taken tutorial classes for the students of Post B.Sc. Integrated Ph.D. 2002 at our Centre on the course of Mathematical Physics taught by Prof. T. K. Das of Calcutta University and Prof. Abhijit Mookerjee of S.N.B.N.C.B.S.

## Faculty Publications

### *i) In journals*

1. **R. Banerjee** and P. Mukherjee, (2002), A canonical approach to the quantisation of the damped anharmonic oscillator, *J. Phys. A*, 35, 5591.
2. **R. Banerjee**, **B. Chakraborty** and S. Ghosh, (2002), Noncommutativity in an open string: New results in a gauge independent approach, *Phys. Lett. B*, 537, 340.
3. **R. Banerjee**, (2003), Noncommuting electric fields and algebraic consistency in noncommutative gauge theories, *Phys. Rev. D*, 67, 105002.
4. **S. K. Sharma** and **S. Banerjee**, (2003), Role of approximate phase functions in Monte Carlo simulation of light propagation in tissues, *J. Opt. A*, 5, 294-302.
5. **J. Chakrabarti**, (2003), Instabilities in a spatially correlated autocatalytic chemical system, *Journal of Chemical Physics*, 118, 249.
6. **J. Chakrabarti**, J. Dzubiela and H. Loewen (2003), Dynamical instabilities in driven colloids, *Euro Phys. Lett.*, 61, 415.
7. **S.K. Chakrabarti**, P. Goldoni, P. J. Witta, A. Nandi, S. Das, (2002), On the ejection mechanism of bullets in SS 433, *Astrophys. J. Lett*, v.576, L45.
8. I. Chattopadhyay and **S.K. Chakrabarti**, (2002), Effects of radiative acceleration and radiation drag on outflows and jets, *MNRAS*, 333, 454.
9. **S. K. Chakrabarti**, A. Nandi, S. Manickam, S. Mandal and A. R. Rao, (2002), Spectral signature of wind formation from post-shock region in GRS1915+105 accretion disk, *Astrophys. J. Lett.*, V. 579, p 21.
10. **S.K. Chakrabarti**, S. Pal, K. Acharya, S. Mandal, S. Chakrabarti, R. Khan, B. Bose, (2002), VLF observation during Leonid Meteor Shower-2002 from Kolkata, *Ind. J. Phys.*, v 76B, 693.
11. S. Naik, A. R. Rao and **S. K. Chakrabarti**, (2002), Fast transition between high-soft and low-soft states in GRS 1915+105: Evidence for a critically viscous accretion Disk, *J. Astron. Astrophys.*, 23, 213.
12. S. Das and **S. K. Chakrabarti**, (2002), Standing shocks around black holes and estimation of outflow rates, *J. Astron Astrophys.*, 23, 143.
13. I. Chattopadhyay and **S. K. Chakrabarti**, (2002), Radiatively driven winds from effective boundary layer around black holes, *J. Astron. Astrophys*, 23, 155.
14. K. Acharya, **S. K. Chakrabarti**, D. Molteni, (2002), Interaction of accretion shocks with winds, *J. Astron. Astrophys*, 23, 155.
15. **S.K. Chakrabarti**, (2002), How thick are the Saturn's rings? in *Bulletin of the Astronomical Society of India*, V. 30, p.563.
16. Tomy Scaria and **Biswajit Chakraborty**, (2002), Wigner's little group as a gauge generator in linearized gravity theories, *Class. Quant. Grav.*, 19, 4445-4462.
17. V. Banerjee and **S. Dattagupta**, (2002), Model quantum magnet - II : calculation of NMR lineshapes, *Phys. Rev. B*, 66, 064418-064427.
18. **S. Dattagupta**, (2003), Coherence versus decoherence, *Pramana*, 59, 203-219.

19. M. Mitra, **P.A. Sreeram** and **S. Dattagupta**, (2003), Polaronic heat capacity in the Anderson-Hasegawa model, *Phys. Rev. B*, 67, 132406-132409.
20. Ram Narayan Deb, Avinash Khare and **Binayak Dutta-Roy**, (2003), Complex optical potentials & Pseudo-Hermitian Hamiltonians, *Physics Letters A*, 307, 215.
21. Sumana Banerjee and **G. Gangopadhyay**, (2002), Spectra of displaced distorted oscillator molecular system, *Chem. Phys. Letts.*, 359, 295-302.
22. Dipankar Rana and **G. Gangopadhyay**, (2003), Studies on energy transfer in dendrimer supermolecule using classical random walk model and Eyring model, *J. Chem. Phys.*, 118, 434-443.
23. Sujata Paul and **G. Gangopadhyay**, (2003), Power law relaxation kinetics in multistep reversible reaction, *Chem. Phys. Letts.*, vol-369, 643-649.
24. **P. Guha**, (2002), Applications of Nambu mechanics in hydrodynamical systems, *Journal of Mathematical Physics*, 43, 4035.
25. **P. Guha**, (2002), Geometry of Kaup-Newell equation, *Reports in Mathematical Physics*, 50,1-13.
26. **P. Guha**, (2002), Diffeomorphism with some Sobolev metric, geodesic flow and Integrable systems, *Journal of Dynamical Systems and Control Theory*, 8,529.
27. **P. Guha**, (2002), Euler-Poincaré formalism of KdV-Burgers and higher order nonlinear Schroedinger equations, *Regular and Chaotic Dynamics*, No. 7, 425.
28. **P. Guha**, (2002), Generalized Poisson mechanics in D-Brane, *International Journal of Modern Physics*, 17A, 4759-4775.
29. **P. Guha**, (2003), Moving space curve equations and a family of coupled KdV type systems, *Chaos Soliton and Fractals*, 15, 41-46.
30. **A. Lahiri**, (2002), Gauge transformations of the Non-Abelian Two-Form, *Mod. Phys. Lett. A*, 17, 1643.
31. **A. Lahiri**, (2002), Local symmetries of the Non-Abelian Two-Form, *J. Phys. A*, 35, 8779.
32. **A. S. Majumdar** and D. Home, (2002), Interpreting the time of decay measurement: phenomenological significance of the Bohm model, *Phys. Lett. A*, 296, 176.
33. S. Bandyopadhyay, **A. S. Majumdar** and D. Home, (2002), Quantum mechanical effects in a time-varying reflection barrier, (2002), *Phys. Rev. A*, 65, 052718.
34. **A. S. Majumdar** and D. Home, (2002), Quantum superarrivals and information transfer through a time-varying boundary, *Pramana-J. Phys.*, 59, 321.
35. Md. Manirul Ali, **A. S. Majumdar** and D. Home, (2002), Understanding quantum superarrivals using the Bohmian model, *Phys. Lett. A*, 304, 61.
36. **A. S. Majumdar**, (2003), Domination of black hole accretion in brane cosmology, *Phys. Rev. Lett.*, 90,031303.
37. **R. P. Malik**, (2002), Superfield approach to BRST cohomology, *J. Phys. A: Math Gen* 35, 3711-3725.
38. **R. P. Malik**, (2002), Topological aspects of Abelian gauge theory in superfield formulation, *J. Phys. A: Math Gen*, 35, 6919-6930.
39. **R. P. Malik**, (2002), Superfield approach to topological features of non-Abelian



- gauge theory, *J. Phys. A: Math Gen* 35, 8817-8830.
40. **K. Mandal**, S. Chakraverty, S. Pan Mandal, P. Agudo, M. Pal and D. Chakravorty, (2002), Size dependent magnetic properties of  $Mn_{0.5}Zn_{0.5}Fe_2O_4$  nanoparticles in  $SiO_2$  matrix, *Journal of Applied Physics*, 92, pg. 501-505.
  41. **K. Mandal**, T. K. Krause and D. L. Atherton, (2003), Characterization of magnetic materials by Barkhausen noise measurement, *Indian Journal of Physics*, 77A, pg. 93-97.
  42. H. S. Mani and **Manu Mathur**, (2002),  $SU(N)$  Coherent States, *Journal of Mathematical Physics*, 43, 5351.
  43. **S. S. Manna** and P. Sen, (2002), Modulated scale-free network in Euclidean space, *Phys. Rev. E.*, 66, 066114.
  44. N. I. Lebovka, **S. S. Manna**, S. Tarafdar and N. Teslenko, (2002), Percolation in models of thin film depositions, *Phys. Rev. E.*, 66, 066134.
  45. **S. S. Manna**, (2002), Self-organization in a granular medium by internal avalanches, *Phase Transitions*, 75, 529.
  46. **S. S. Manna** and A. L. Stella, (2002), Self-organized random walks and stochastic sandpile: from linear to branched avalanches, *Physica A*, 316, 135-143.
  47. R. Karmakar, **S. S. Manna** and T. Dutta, (2003), A geometrical model of diagenesis using percolation theory, *Physica A*, 318, 113.
  48. G. Mukherjee and **S. S. Manna**, (2003), Quasistatic scale-free networks, *Phys. Rev. E.*, 67, 012101.
  49. P. Sen, S. Dasgupta, A. Chatterjee, **P. A. Sreeram**, G. Mukherjee and **S. S. Manna**, (2003), Small-world properties of the Indian railway network, *Phys. Rev. E.*, 67, 036106.
  50. **Anita Mehta** and R. A. Cowley, (2002), Epitaxial growth of thin films - a statistical mechanical model, *J. Phys. - Cond. Mat.*, 14, 17, 4385-4392.
  51. G C Barker and **Anita Mehta**, (2002), Inhomogeneous relaxation in vibrated granular media: consolidation waves, *Phase Transitions*, 75, 519-528 (2002).
  52. **A. Mohari**, (2003), Markov-shift in non-commutative probability, *Journal of Functional Analysis*, 199, 189-209, *Academic Press-Elsevier Science*.
  53. **A. Mohari**, (2003), Ergodicity of homogeneous Brownian flows, stochastic processes and their application, 105, 99-116, *Elsevier Science*.
  54. A. Ray, P. Das, S.K. Saha, S.K. Das and **A. Mookerjee**, (2002), Effect of host medium on the L/K ratio in  $^7Be$  electron capture, *Phys. Rev. C*, 66, 012401.
  55. Biplab Ganguli and **A. Mookerjee**, (2002), Optical properties of III-V semiconducting alloys, *Int. J. Mod. Phys. B* 16, 3681.
  56. D. Paudyal, **T. Saha-Dasgupta** and **A. Mookerjee**, (2003), Phase stability of NiPt alloys, *J. Phys. Condens. Matter*, 15, 1029 .
  57. **A. Mookerjee**, **T. Saha-Dasgupta**, I. Dasgupta, A. Arya, S. Banerjee and G.P. Das, (2003), A first principles thermodynamic approach to ordering in binary alloys, *Bull. Mat. Sci.*, 26, 79.
  58. Ashish Bhattacharjee, M. Ahmed, **A. Mookerjee** and A. Halder, (2003), Effect of alloying on the electronic and magnetic properties of Fe, Co and Ni with Au and Ag, *Bull. Mat. Sci.*, 26, 90.

59. A. Banerjea, R.P. Datta, **A. Mookerjee** and A.K. Bhattacharya, (2003), Simulated annealing studies of small Cu Clusters, *Int. J. Mod. Phys.B*, 17, 273.
60. M. Kabir, **A. Mookerjee**, R.P. Datta, A. Banerjea and A.K. Bhattacharya, (2003), An ab-initio full-potential muffin-tin orbitals based molecular dynamics study of small Cu Clusters, *Int. J. Mod. Phys. B*, 17, 2061.
61. A. Huda, M. Ahmed, A. Halder and **A. Mookerjee**, (2003), Effect of alloying on the electronic and magnetic properties of AuFe, AgFe and CuFe, *Int. J. Mod. Phys. B*, 17, 281.
62. S.N. Behera, B.K. Panda, **S. Mukherjee** and P. Entel, (2002), A comparison of different orthogonal tight-binding molecular dynamics simulation methods for silicon clusters, *Phase Transitions*, Vol. 75, pp.41-50.
63. **P. K. Mukhopadhyay** and D. Das, (2003), Sound velocity study of Ni-Mo systems, *Indian Journal of Physics*, 77A (2),159-162.
64. **T. Saha-Dasgupta** and S. Satpathy, (2003), Wannier-like functions and tight-binding parametrization for the manganese bands in  $\text{CaMnO}_3$ , *J. Phys. (Condens. Matter)*, vol 15, 1685.
65. **T. Saha-Dasgupta** and R. Valenti, (2002), Comparative study between two quantum spin systems  $\text{KCuCl}_3$  and  $\text{TlCuCl}_3$ , *Europhys. Lett.*, vol 60, 309.
66. V. V. Mazurenko, A. I. Lichtenstein, M. I. Katsnelson, I. Dasgupta, **T. Saha-Dasgupta**, and V. I. Anisimov, (2002), Nature of insulating state in  $\text{NaV}_2\text{O}_5$  above charge-ordering transition: A cluster dynamical mean-field study, *Phys. Rev. B*, 66, *Rapid Commun*, 081104 (R).
67. R. Valenti, **T. Saha-Dasgupta** and C. Gros, (2002), Nature of the spin-singlet ground state in  $\text{CaCuGe}_2\text{O}_6$ , *Phys. Rev. B*, 66, 054426.
68. W. Strepp, **S. Sengupta**, and P. Nielaba, (2002), Phase transitions of soft disks in external periodic potentials: A Monte Carlo study, *Phys. Rev. E*, 66, 056109.
69. J. J. Joshi, H. S. Shah, **S. K. Sharma** and R. V. Mehta, (2002), Scattering characteristics of small particles in resonance region: Effect of shape, *Indian Journal of Pure and Appl Phys.*, 40,421-429.
70. A. Chaudhuri, **P. A. Sreeram** and **S. Sengupta**, (2002), Growing smooth interfaces with inhomogeneous moving external fields: Dynamical transitions, devil's staircases, and self-assembled ripples, *Phys.Rev. Lett.*, 89, 176101.

## ii) In proceedings

1. **R. Banerjee**, Wigner's little group as a generator of gauge transformations, (July 2002), in *Proceedings of the Wigner Centennial Conference held at Pecs, Hungary, 2002* (published in Heavy-ion physics and quantum electronics(new series of Acta Physica Hungarica).
2. **S.K. Chakrabarti**, (2002), Effect of an accretion disk on the gravitational wave signal from an inspiralling binary black holes, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 1639.
3. **S.K. Chakrabarti** and I. Chattopadhyay, (2002), Bulk motion comptonization — a sure sign of black holes, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2253.
4. **S.K. Chakrabarti**, A. Nandi and S. G. Manickam, (2002), Relation of light curve

- behaviour with accretion rates in black hole candidate GRS1915+105, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2209.
5. I. Chattopadhyay and **S. K. Chakrabarti**, (2002), Generation and acceleration of jets from effective boundary layer around black hole, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2289.
  6. **S.K. Chakrabarti**, (2002), State-of-the-art accretion and wind solutions around black holes, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 1613.
  7. **S.K. Chakrabarti**, S.G. Manickam, A. Nandi and A.R. Rao, (2002), Understanding galactic black hole candidate GRS 1915+105, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2279.
  8. D. Molteni, M.A. Valenza, G. Gerardi, **S.K. Chakrabarti**, K. Acharya, (2002), The many ways a shock wave can oscillate close to a black hole, *Proceedings of IXth Marcel Grossman Meeting*, Ed. Remo Ruffini, 2257.
  9. A. Nandi and **S.K. Chakrabarti**, (2002), Understanding of the inflow/outflow characteristics of the black hole candidate GRS 1915+105, in *Multicolour Universe*, Ed. R.K. Manchanda and B. Paul, 109.
  10. **K. Mandal**, S. Pan Mandal and M. Vazquez, (2002), Annealing effect on the giant magnetoimpedance of amorphous microwire, in *Proceedings of Condensed Matter Days-2002*, pg. 22.
  11. **K. Mandal** and D. L. Atherton, (2002), The effects of defect depth and bending stress on magnetic flux leakage signals, in *Proceedings of NDE 2002*, pg. 104.
  12. **K. Mandal**, S. Chakraverty and S. Kumar, (2003), Magnetic properties NiFe<sub>2</sub>O<sub>4</sub>-SiO<sub>2</sub> nanoparticles, in *Proceedings of National Seminar on Science & Technology of Nanomaterials*, pg. 16.
  13. **K. Mandal**, (2002), Use of magnetic flux leakage signals for condition monitoring of pipelines, in *Proceedings of Workshop on Reliability through NDE*, pg. 24.
  14. **A. S. Majumdar** and **N. Nayak**,(2002), Effects of decoherence in entangled atomic wavefunctions in microcavities in *Foundations of Quantum Mechanics in the Light of New Technology*, edited by Y. A. Ono and K. Fujikawa (World Scientific, 2002), pp.152-155.
  15. **N. Nayak**, (2002), Maser and laser action with one atom in proceedings of the Sixth International Conference on Optoelectronics, Fiber Optics and Photonics, December 16-18, 2002, TIFR.
  16. O. K. Andersen, **T. Saha-Dasgupta** and S. Ezhov, (2003), Third-generation muffin-tin orbitals, *Bull. of Mater. Sci.*, vol 26, 19.
  17. D. Nguyen-Manh, **T. Saha-Dasgupta** and O. K. Andersen, (2003), Tight-binding model for carbon from the third-generation LMTO method: A study of transferability, *Bull. of Mater. Sci.*, vol 26, 27.
  18. Abhishek Chaudhuri and **Surajit Sengupta**, (2003), Profile-driven interfaces in 1+1 dimensions: periodic steady states, dynamical melting and detachment, *Physica A*, 318, 30.
  19. **Surajit Sengupta** and Madan Rao, (2003), Statistical mechanics of nucleation in solids: a kinetics driven morphological transition, *Physica A*, 318, 251.

**iii) Edited volumes**

1. **S. K. Chakrabarti** (guest Editor), *Frontiers in Astrophysics* (Allied Publishers, New Delhi).
2. **S. S. Manna** edited with J. K. Bhattacharjee, the proceedings of the *International Conference on Statistical Physics, Statphys- Kolkata IV*, held in IACS and SNBNCBS during 14-19 January, 2002. This has been published by Elsevier, as a special issue of *Physica A*, volume 318, 2003.
3. **Anita Mehta**, Biplab Sanyal and Abhijit Mookerjee, Modelling the growth of rough surfaces: coupled continuum equations, electronic structure and magnetic properties, pp. 280-307, in *Electronic Structure of alloys, surfaces and clusters: systems without lattice translational symmetry*, *Advances in Condensed Matter Science*, vol. 4, eds. A. Mookerjee and Dipankar Das Sarma, Taylor and Francis, 2003.
4. *Challenges in Granular Physics*, editors Thomas C. Halsey and **Anita Mehta** World Scientific, 2002.
5. D. D. Sarma, N. Shanthi and **T. Saha-Dasgupta**, Estimation of electronic interaction strengths from *ab-initio* calculations, *Electronic Structure of Alloys, Surfaces and Clusters*, ed. A. Mookerjee and D. D. Sarma, *Advances in Condensed Matter Sciences*, vol 4, Taylor and Francis, 2003, pg 261-279.
6. **T. Saha-Dasgupta** and A. Finel, Equilibrium and non-equilibrium statistical mechanics of alloys in Fcc lattice, *Electronic Structure of Alloys, Surfaces and Clusters* ed. A. Mookerjee and D. D. Sarma, *Advances in Condensed Matter Sciences*, vol 4, Taylor and Francis, 2003, pg 230-260.

English  
**PART-B**

**S. N. Bose National Centre for Basic Sciences -  
Block-JD, Sector-III, Salt Lake, Kolkata 700 098**

**BUDGET SUMMARY 2002-2003**

The funds come from the Department of Science and Technology, New Delhi. The following is the summary of the budget estimates for the year 2002-2003.

Figures in Lakhs (Rs)

	Actuals 2001-2002	Budget Estimate 2002-2003	Revised Estimate 2002-2003
Non-Plan	44.09	54.03	* 55.64
Plan	254.38	598.97	* 611.05
<b>Total</b>	<b>298.47</b>	<b>653.00</b>	<b>666.69</b>

\* Sanctioned by DST Plan Rs.650 lakhs, Non-Plan Rs.45 lakhs and released as under :

**Non-Plan**

- |  |                 |
|--|-----------------|
| 1. Sanction Letter No.AI/SNB/003/2002 dated 08.04.02 | Rs. 8.00 lakhs  |
| 2. Sanction Letter No.AI/SNB/003/2002 dated 30.05.02 | Rs. 17.00 lakhs |
| 3. Sanction Letter No.AI/SNB/003/2002 dated 16.01.03 | Rs. 15.00 lakhs |
| 4. Sanction Letter No.AI/SNB/003/2002 dated 17.02.03 | Rs. 5.00 lakhs  |

Rs. 45.00 lakhs

**Plan**

- |  |                  |
|--|------------------|
| 1. Sanction Letter No.AI/SNB/003/2002 dated 08.04.02 | Rs. 100.00 lakhs |
| 2. Sanction Letter No.AI/SNB/003/2002 dated 30.05.02 | Rs. 200.00 lakhs |
| 3. Sanction Letter No.AI/SNB/003/2002 dated 16.01.03 | Rs. 100.00 lakhs |
| 4. Sanction Letter No.AI/SNB/003/2002 dated 17.03.03 | Rs. 200.00 lakhs |
| 5. Sanction Letter No.AI/SNB/003/2002 dated 31.03.03 | Rs. 50.00 lakhs  |

Rs.650.00 lakhs

**Total**      **Rs.695.00 lakhs**

**Auditors' Report to the Governing Body of  
S. N. Bose National Centre for Basic Sciences**

1. We have audited the attached BALANCE SHEET of Satyendra Nath Bose National Centre for Basic Sciences, as at 31st March, 2003 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.
2. 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.
3.
  - (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.
4. In our opinion and to the best of our information and according to the explanations given to us, the said accounts read with Schedule No.25 give a true and fair view in conformity with the accounting principles generally accepted in India
  - (i) in the case of the Balance Sheet, of the state of affairs of the Centre as at 31st March 2003; and
  - (ii) in the case of the Income and Expenditure Account, of the Surplus for the year ended on that date.

*For* **ROY & BAGCHI**  
*Chartered Accountants*  
*Sd/-*  
**U. ROYCHOUDHURI**  
*Partner*

**Kolkata**

**Dated: 05.08.2003**

**S. N. Bose National Centre for Basic Sciences**  
**Block-JD, Sector-III, Salt Lake, Kolkata 700 098**

**BALANCE SHEET AS AT 31<sup>ST</sup> MARCH 2003**

	Schedule	Current year	Amount (Rs.) Previous year
<b>FUNDS AND LIABILITIES</b>			
Corpus/Capital fund	1	176996231.00	144001753.00
Reserves and Surplus	2	-19357452.08	-15445234.38
Earmarked/Endowment funds	3	9143407.51	2975962.52
Secured loans and Borrowings	4		
Unsecured loans and Borrowings	5		
Deferred credit liabilities	6		
Current liabilities and Provisions	7	1999762.26	1717342.45
<b>TOTAL</b>		<b>168781948.69</b>	<b>133249823.59</b>
<b>ASSETS</b>			
Fixed Assets	8	125913539.95	116276376.24
Investments-from Earmarked/Endowment funds	9	2229850.00	1672224.00
Investments - Others	10	16225073.99	9563400.99
Current assets, loans, advances etc.	11	24413484.75	5737822.36
Miscellaneous expenditure (to the extent not written off or adjusted)			
<b>TOTAL</b>		<b>168781948.69</b>	<b>133249823.59</b>
Significant Accounting Policies	24		
Contingent Liabilities and Notes on Accounts	25		

*Sd/-*  
**S. Dattagupta**  
*Director*

S. N. Bose National Centre for Basic Sciences

*Sd/-*  
**D. C. Banerji**  
*Acting Administrative Officer*

S. N. Bose National Centre for Basic Sciences

*Sd/-*  
**U. Roychoudhuri**  
*Partner*  
**For ROY & BAGCHI**  
*Chartered Accountants*

Kolkata

Dated : 05.08.2003



**S. N. Bose National Centre for Basic Sciences**  
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**INCOME AND EXPENDITURE ACCOUNT**  
**FOR THE YEAR ENDED 31<sup>ST</sup> MARCH 2003**

	Schedule	Current Year	Amount (Rs.) Previous Year
<b>INCOME</b>			
Income from Sales/Services	12	266622.80	118185.42
Grants/Subsidies	13	34105522.00	24125000.00
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	2084053.00	324237.50
Other Income	18	184288.20	138539.00
Increase/decrease in stock of finished goods and works-in-progress	19		
<b>TOTAL (A)</b>		<b>36640486.00</b>	<b>24705961.92</b>
<b>EXPENDITURE</b>			
Establishment Expenses	20	17207773.03	14475368.39
Other Administrative Expenses etc.	21	13327102.27	10012725.11
Expenditure on Grants, Subsidies etc.	22		
Interest	23		
Depreciation (Net total at the year-end - corresponding to Schedule 8)		5611039.50	5504054.00
<b>TOTAL (B)</b>		<b>36145914.80</b>	<b>29992147.50</b>
<b>Balance being excess of Income over Expenditure (A-B)</b>		494571.20	-5286185.58
Prior period adjustments		41319.10	-394030.31
Transfer to/from General Reserve			
Balance being Surplus/(Deficit) carried to General Fund		535890.30	-5680215.89
Significant Accounting Policies	24		
Contingent Liabilities and Notes on Accounts	25		

Sd/-  
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*Director*

S. N. Bose National Centre for Basic Sciences

Sd/-  
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*Partner*  
**For ROY & BAGCHI**  
*Chartered Accountants*

Kolkata

Dated : 05.08.2003

**S. N. Bose National Centre for Basic Sciences**  
**Block-JD, Sector-III, Salt Lake, Kolkata 700 098**

Schedules forming part of Balance Sheet as at 31.3.2003

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 1</b>		
<b>CORPUS/CAPITAL FUND</b>		
Balance as at the beginning of the year	144001753.00	136126753.00
Add: Contributions towards Corpus/ Capital Fund	12994478.00	7875000.00
Add: Grant-in-aid in transit	20000000.00	176996231.00
<b>Balance as at the year - end</b>	<b>176996231.00</b>	<b>144001753.00</b>

**SCHEDULE 2****RESERVES AND SURPLUS**

1. <u>Capital Reserve:</u>				
As per last Account				
Addition during the year				
Less: Deductions during the year				
2. <u>Revaluation Reserve:</u>				
As per last Account				
Addition during the year				
Less: Deductions during the year				
3. <u>Special Reserves:</u>				
As per last Account				
Addition during the year				
Less: Deductions during the year				
4. <u>General Reserve:</u>				
As per last Account	-15445234.38		7775335.52	
Less: Accumulated Depreciation			-17540354.00	
Less: Leave Salary (Accumulated)	-4448108.00			
Add: Surplus during the year	535890.30	-19357452.08	-5680215.90	-15445234.38
<b>TOTAL</b>		<b>-19357452.08</b>		<b>-15445234.38</b>

Sd/  
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*Partner*  
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*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences**  
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Schedules forming part of Balance Sheet as at 31.3.2003

SCHEDULE 3 EARMARKED/ENDOWMENT FUNDS	FUND-WISE BREAK UP			Amount (Rs.) TOTALS	
	Project Fund	Leave Salary Fund	Gratuity Fund	Current Year	Previous Year
	a) Opening balance of the funds	1020621.52		1955341.00	2975962.52
b) Additions to the Funds					
(i) Donations/grants	2933559.00		342749.00	3276308.00	1887741.00
(ii) Income from investments made on account of funds					303584.00
(iii) Other additions (specify nature)		5106031.00	357780.00	5463811.00	
<b>Total (a+b)</b>	<b>3954180.52</b>	<b>5106031.00</b>	<b>2655870.00</b>	<b>11716081.52</b>	<b>3998668.21</b>
c) Utilisation/Expenditure towards objectives of funds					
(i) <u>Capital Expenditure</u>					
Fixed Assets	767868.50			767868.50	7140.00
Others					
Total					
(ii) <u>Revenue Expenditure</u>					
Salaries, Wages and allowances etc.	1451861.00			1451861.00	881767.50
Rent					
Other administrative expenses	311680.77			311680.77	133798.19
Refund of Grant-in-aid against CSIR	41263.74			41263.74	
<b>Total (c)</b>	<b>2572674.01</b>			<b>2572674.01</b>	<b>1022705.69</b>
<b>Net balance as at the year-end (a+b-c)</b>	<b>1381506.51</b>	<b>5106031.00</b>	<b>2655870.00</b>	<b>9143407.51</b>	<b>2975962.52</b>

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*Partner*  
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*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences**  
**Block-JD, Sector-III, Salt Lake, Kolkata 700 098**

Schedules forming part of Balance Sheet as at 31.3.2003

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 4</b>		
<b>SECURED LOANS AND BORROWINGS</b>		
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)		
<b>TOTAL</b>	<b>Nil</b>	<b>Nil</b>

*Sd/-*  
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*Partner*  
 For **ROY & BAGCHI**  
*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences**  
**Block-JD, Sector-III, Salt Lake, Kolkata 700 098**

Schedules forming part of Balance Sheet as at 31.3.2003

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 5</b>		
<b>UNSECURED LOANS AND BORROWINGS</b>		
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)		
<b>TOTAL</b>	<u>Nil</u>	<u>Nil</u>

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 6</b>		
<b>DEFERRED CREDIT LIABILITIES</b>		
a) Acceptances secured by hypothecation of capital equipment and other assets		
b) Others		
<b>TOTAL</b>	<u>Nil</u>	<u>Nil</u>

Sd/  
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*Partner*  
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*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences**  
**Block-JD, Sector-III, Salt Lake, Kolkata 700 098**

Schedules forming part of Balance Sheet as at 31.3.2003

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 7</b>		
<b>CURRENT LIABILITIES AND PROVISIONS</b>		
<b>A. CURRENT LIABILITIES</b>		
1. Acceptances		
2. Sundry Creditors:		
a) For Capital Expenditure	30000.00	30000.00
b) Others - Revenue Expenditure	488507.00	848881.41
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	1411589.26	768795.04
<b>TOTAL (A)</b>	<b>1930096.26</b>	<b>1647676.45</b>
<b>B. PROVISIONS</b>		
1. For Taxation		
2. Gratuity		
3. Superannuation/Pension		
4. Accumulated Leave Encashment		
5. Trade Warranties/Claims		
6. Others (Specify) - Adhoc Bonus	69666.00	69666.00
<b>TOTAL (B)</b>	<b>69666.00</b>	<b>69666.00</b>
<b>TOTAL (A + B)</b>	<b>1999762.26</b>	<b>1717342.45</b>

Sd/-  
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*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences**  
**Block-JD, Sector-III, Salt Lake, Kolkata 700 098**

Schedules forming part of Balance Sheet as at 31.3.2003

**SCHEDULE 8**

**FIXED ASSETS**

DESCRIPTION

DESCRIPTION	GROSS BLOCK			DEPRECIATION				Amount (Rs.)		
	Cost/valuation As at beginning 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	NET BLOCK	
									Current year-end	Previous year-end
<b>A. FIXED ASSETS:</b>										
1. Land										
a) Freehold										
b) Leasehold	11949393.27	390039.00		12339432.27					12339432.27	11949393.27
2. Buildings										
a) On Freehold Land										
b) On Leasehold Land	77911774.61	2129438.46		80041213.07	6409346.78	1285932.85	7695279.63	72345933.44	71502427.83	
c) Ownership Flats/Premises										
d) Superstructures on Land not belonging to the entity										
3. Plant Machinery & Equipment	1295639.00	547111.50		1842750.50	402841.02	63152.00	465993.02	1376757.48	892797.95	
4. Vehicles	363026.00			363026.00	169483.80	34487.47	203971.27	159054.73	193542.20	
5. Furniture, Fixtures	8589941.00	1396254.80		9986195.80	3562411.06	887240.43	4449651.49	5536544.31	5027529.94	
6. Office Equipemnt	666000.00	373897.70		1039897.70	281048.37	45279.15	326327.52	713570.18	384951.63	
7. Computer/Peripherals	15097615.90	1661552.00		16759167.90	8890807.06	2106826.48	10997633.54	5761534.36	6206808.84	
8. Electric Installations	1744882.00			1744882.00	183381.99	82881.90	266263.89	1478618.11	1561500.00	
9. Library Books	21702512.52	8707234.22		30409746.74	3145088.00	1104281.22	4249369.22	26160377.52	18557424.58	
10. Tubewells & W. Supply										
11. Other Fixed Assets		42675.55		42675.55		958.00	958.00	41717.55		
<b>Total Current Year</b>	<b>139320784.30</b>	<b>15248203.23</b>		<b>154568987.53</b>	<b>23044408.08</b>	<b>5611039.50</b>	<b>28655447.58</b>	<b>125913539.95</b>	<b>116276376.24</b>	
Previous Year	133214856.00	6497199.30	391271.00	139320780.30	17540354.00	5504054.00	23044408.00	116276376.24		
<b>B. CAPITAL WORK-IN-PROGRESS</b>										
<b>TOTAL</b>	<b>139320784.30</b>	<b>15248203.23</b>		<b>154568987.53</b>	<b>23044408.08</b>	<b>5611039.50</b>	<b>28655447.58</b>	<b>125913539.95</b>	<b>116276376.24</b>	

Sd/-  
**U. Roychoudhuri**  
 Partner  
 For **ROY & BAGCHI**  
 Chartered Accountants

**S. N. Bose National Centre for Basic Sciences**  
**Block-JD, Sector-III, Salt Lake, Kolkata 700 098**

Schedules forming part of Balance Sheet as at 31.3.2003

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 9</b>		
<b>INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS</b>		
1. In Government Securities		
2. Other approved Securities		
3. Shares		
4. Debentures and Bonds		
5. Subsidiaries and Joint Ventures		
6. Others (to be specified) - Fixed Deposit with Nationalised Banks	2229850.00	1672224.00
<b>TOTAL</b>	<b>2229850.00</b>	<b>1672224.00</b>

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 10</b>		
<b>INVESTMENTS - OTHERS</b>		
1. In Government Securities		
2. Other approved Securities		
3. Shares		
4. Debentures and Bonds		
5. Subsidiaries and Joint Ventures		
6. Others (to be specified) - Fixed Deposit with Nationalised Banks	16225073.99	9563400.99
<b>TOTAL</b>	<b>16225073.99</b>	<b>9563400.99</b>

Sd/-  
**U. Roychoudhuri**  
*Partner*  
**For ROY & BAGCHI**  
*Chartered Accountants*



**S. N. Bose National Centre for Basic Sciences**  
**Block-JD, Sector-III, Salt Lake, Kolkata 700 098**  
**Schedules forming part of Balance Sheet as at 31.3.2003**

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 11</b>		
<b>CURRENT ASSETS, LOANS, ADVANCES ETC.</b>		
<b>A. CURRENT ASSETS:</b>		
1. Inventories:		
a) Stores and Spares	166529.55	175531.57
b) Loose Tools		
c) Stock-in-trade		
Finished Goods		
Work-in-progress		
Raw Materials		
Stock of Books		755600.00
2. Sundry Debtors:		
a) Debts outstanding for a period exceeding six months		
b) Others		
3) Cash balances in hand (including cheques/drafts and imprest)	4410.35	4730.83
4) Bank Balances:		
a) With Scheduled Banks:		
On Current Accounts (including Project A/C)	1631480.85	2834868.12
On Deposit Accounts (includes margin money)		
On Savings Accounts		
b) With non-Scheduled Banks:		
On Current Accounts		
On Deposit Accounts		
On Savings Accounts		
5. Remittance in Transit	20000000.00	
6. Post Office-Savings Accounts		
<b>TOTAL (A)</b>	<b>21802420.75</b>	<b>3770730.46</b>

*Sd/-*  
**U. Roychoudhuri**  
*Partner*  
**For ROY & BAGCHI**  
*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences**  
**Block-JD, Sector-III, Salt Lake, Kolkata 700 098**

Schedules forming part of Balance Sheet as at 31.3.2003

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 11 (Contd.)</b>		
<b>CURRENT ASSETS, LOANS, ADVANCES ETC. (Contd.)</b>		
<b>B. LOANS, ADVACNES AND OTHER ASSETS</b>		
1. Loans:		
a) Staff including HBA, Vehicle & PC Advance	1696469.00	753447.00
b) Other Entitites engaged in activities/objectives similar to that of the Entity		
c) Other (Specify)		
2. Advances and other amounts recoverable in cash or in kind or for value to be received:		
a) On Capital Account		
b) Prepayments	260769.00	393192.00
c) Others (Security Deposits)	196052.00	571850.90
d) Contractors & Suppliers(including Project A/C)	35500.00	46500.00
3. Income Accrued:		
a) On Investments from Earmarked/Endowment Funds	143281.00	75041.00
b) On Investments - Others	218993.00	127061.00
c) On Loans and Advances		
d) Others (includes income due unrealised - Rs.....)		
4. Claims Receivable	60000.00	
<b>TOTAL (B)</b>	<b>2611064.00</b>	<b>1967091.90</b>
<b>TOTAL (A + B)</b>	<b>24413484.75</b>	<b>5737822.36</b>

Sd/-  
**U. Roychoudhuri**  
*Partner*  
For **ROY & BAGCHI**  
*Chartered Accountants*

**S. N. 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 31.3.2003

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 12</b>		
<b>INCOME FROM SALES/SERVICES</b>		
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 (Specify) - Guest House	266622.80	118185.42
<b>Total</b>	<b>266622.80</b>	<b>118185.42</b>

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 13</b>		
<b>GRANTS/SUBSIDIES</b>		
(Irrevocable Grants & Subsidies Received)		
1) Central Government	34105522.00	24125000.00
2) State Government(s)		
3) Government Agencies		
4) Institutions/Welfare Bodies		
5) International Organisations		
6) Others (Specify)		
<b>Total</b>	<b>34105522.00</b>	<b>24125000.00</b>

Sd/-  
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*Partner*  
For **ROY & BAGCHI**  
*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences**  
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Schedules forming part of Income & Expenditure  
for the year ended 31.3.2003

		(Amount - Rs.)	
		<u>Current Year</u>	<u>Previous Year</u>
<b>SCHEDULE 14</b>			
<b>FEES/SUBSCRIPTIONS</b>			
1)	Entrance Fees		
2)	Annual Fees/Subscriptions		
3)	Seminar/Program Fees		
4)	Consultancy Fees		
5)	Others (Specify)		
	<b>Total</b>	<u>Nil</u>	<u>Nil</u>

**SCHEDULE 15****INCOME FROM INVESTMENTS**

(Income on Invest. from Earmarked/  
Endowment Funds transferred to Funds)

		Amount (Rs.)			
		<u>Investment from Earmarked Fund</u>		<u>Investment - Others</u>	
		<u>Current Year</u>	<u>Previous Year</u>	<u>Current Year</u>	<u>Previous Year</u>
1)	Interest				
	a) On Govt. Securities				
	b) Other Bonds/Debentures				
2)	Dividends				
	a) On Shares				
	b) On Mutual Fund Securities				
3)	Rents				
4)	Others (Specify)				
	<b>Total</b>	<u>Nil</u>	<u>Nil</u>	<u>Nil</u>	<u>Nil</u>
<b>Transferred to earmarked/endowment funds</b>		<u>Nil</u>	<u>Nil</u>	<u>Nil</u>	<u>Nil</u>

*Sd/-*  
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*Chartered Accountants*

**S. N. 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 31.3.2003**

	Amount (Rs.)	
	Current Year	Previous year
<b>SCHEDULE 16</b>		
<b>INCOME FROM ROYALTY, PUBLICATION ETC.</b>		
1. Income from Royalty		
2. Income from Publications		
3. Others (specify)		
<b>Total</b>	<b>Nil</b>	<b>Nil</b>

	Amount (Rs.)	
	Current Year	Previous year
<b>SCHEDULE 17</b>		
<b>INTEREST EARNED</b>		
1) On Term Deposits:		
a) With Scheduled Banks	2084053.00	324237.50
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		
<b>Total</b>	<b>2084053.00</b>	<b>324237.50</b>

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*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences**  
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Schedules forming part of Income & Expenditure  
for the year ended 31.3.2003

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 18</b>		
<b>OTHER INCOME</b>		
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	184288.20	138539.00
<b>Total</b>	<b>184288.20</b>	<b>138539.00</b>

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 19</b>		
<b>INCREASE/(DECREASE) IN STOCK OF FINISHED GOODS &amp; WORK IN PROGRESS</b>		
a) Closing stock		
Finished Goods		
Work-in-progress		
b) Less: Opening Stock		
Finished Goods		
Work-in-progress		
<b>Net Increase/(Decrease) [a-b]</b>	<b>Nil</b>	<b>Nil</b>

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 20</b>		
<b>ESTABLISHMENT EXPENSES</b>		
a) Salaries and Wages	14620463.00	12936640.64
b) Allowances and Bonus	95706.50	100938.04
c) Contribution to Provident Fund	612929.00	616980.00
d) Contribution to Other Fund (specify)		
Gratuity Fund & Leave Salary Fund	1015703.00	350437.00
e) Staff Welfare Expenses (Medical)	450511.53	303499.61
f) Expenses on Employees' Retirement and Terminal Benefits		
f) Others (specify)	412460.00	166873.10
<b>Total</b>	<b>17207773.03</b>	<b>14475368.39</b>

Sd/-  
**U. Roychoudhuri**  
Partner  
For **ROY & BAGCHI**  
Chartered Accountants

**S. N. 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 31.3.2003

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 21</b>		
<b>OTHER ADMINISTRATIVE EXPENSES ETC.</b>		
a) Visiting Scientist - Professors	422539.00	252649.00
b) Academic Staff Research Expenses	13945.20	205673.51
c) Library General Expenses	94916.00	74094.48
d) Electricity and Power	2008283.54	2284306.00
e) Water Charges		
f) Insurance	9812.00	16550.00
g) Repairs and Maintenance	4429084.08	2886636.97
h) Excise Duty		
i) Rent, Rates and Taxes	275363.00	335364.00
j) Vehicles Running and Maintenance including hire charges	483977.44	460242.37
k) Postage, Telephone and Communication Charges	958516.07	686967.95
l) Printing and Stationery	228835.09	215235.00
m) Travelling and Conveyance Expenses including TPSC	980050.25	594898.25
n) Expenses on Seminars/Workshops	770473.20	489019.90
o) Subscription Expenses		
p) Expenses on Fees		
q) Auditors' Remmuneration	18360.00	17000.00
r) Hospitality Expenses	37503.57	163733.00
s) Professional Charges (Contract Services & Legal Charges etc.)	539309.00	426032.00
t) Provision for Bad and Doubtful Debts/Advances		
u) Irrecoverable Balances Written-off		
v) Integrated Ph.D. and Education Programme	641606.00	512175.00
w) Import Clearing Expenses	47709.00	8298.00
x) Distribution of Books	749960.00	
y) Advertisement and Publicity	65809.00	30472.00
z) Others (specify)	551050.83	353377.69
<b>Total</b>	<b>13327102.27</b>	<b>10012725.12</b>

*Sd/-*  
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*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences**  
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Schedules forming part of Income & Expenditure  
for the period/year ended 31st March 2003

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 22</b>		
<b>EXPENDITURE ON GRANTS, SUBSIDIES ETC.</b>		
a) Grants given to Institutions/Organisations		
b) Subsidies given to Institutions/Organisations		
<b>Total</b>	<b>Nil</b>	<b>Nil</b>

	Amount (Rs.)	
	Current Year	Previous Year
<b>SCHEDULE 23</b>		
<b>INTEREST</b>		
a) On Fixed Loans		
b) On Other Loans (including Bank Charges)		
c) Others (specify)		
<b>Total</b>	<b>Nil</b>	<b>Nil</b>

*Sd/-*  
**U. Roychoudhuri**  
*Partner*  
For **ROY & BAGCHI**  
*Chartered Accountants*



**S. N. Bose National Centre for Basic Sciences**  
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**SCHEDULE 24****SIGNIFICANT ACCOUNTING POLICIES  
(2002-2003)****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**

2.1 Stores and Spares (including machinery spares) are valued at cost.

**3. INVESTMENTS**

3.1 Investments are carried at cost.

**4. FIXED ASSETS**

4.1 Fixed assets are stated at cost of acquisition inclusive of inward freight, duties and taxes and incidental and direct expenses related to acquisition.

4.2 Fixed Assets received by way of non-monetary grants (other than towards the Corpus Fund), are capitalised at value stated, by corresponding credit to Capital Fund.

**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.

**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**

7.1 Transactions denominated in foreign currency are accounted at the exchange rate prevailing at the date of transaction.

**8. RETIREMENT BENEFITS**

8.1 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.

8.2 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.

*Sd/-*

U. Roychoudhuri

*Partner*

For **ROY & BAGCHI**

*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences**  
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.7,73,397.00 against 100% margin money by way of fixed deposit (Previous year Rs.3,54,700.00).

– Letters of Credit opened by Bank on behalf of the Entity – Rs. Nil (Previous year Rs. Nil)

– 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 *Capital Commitments*

Estimated value of contracts remaining to be executed on capital account and not provided for (net of advances) Rs. Nil (Previous year Rs. Nil).

2.2 *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.

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 The following advances are considered doubtful of recovering:

a) Advance to Suppliers (Project)	Rs. 24500.00
b) Excess refund of Earnest Money	Rs. 5000.00
c) Staff Advance	Rs. 2000.00

2.7 Transfer of Fixed Assets from project to general fund upon completion of project has not been done pending approval from DST, Govt. of India.

2.8 Corresponding figures for the previous year have been regrouped/rearranged, wherever necessary.

*Sd/-*

U. Roychoudhuri

*Partner*

For ROY & BAGCHI

*Chartered Accountants*

**S. N. Bose National Centre for Basic Sciences  
Block-JD, Sector-III, Salt Lake, Kolkata 700 098**

**Receipts and Payments Account  
for the year ended 31st March, 2003**

<u>RECEIPTS</u>	<u>Current Year</u>	<u>Previous Year</u>	<u>PAYMENTS</u>	<u>Current Year</u>	<u>Previous Year</u>
I. Opening Balances			I. Expenses :		
a) Cash in hand	4730.83	11646	a) Establishment Expenses	15922965.03	14823241
b) Bank Balances :			b) Administrative Expenses	11968850.74	8930020
i. In current accounts	2834868.12	1634102	II. Payments made against funds for various Projects		440773
ii. In deposit accounts	9563400.99		III. Investments and deposits made		
iii. Savings accounts			a) Out of Earmarked/Endowment funds	283117.00	434417
II. Grants Received			b) Out of Own Funds(Investment-Others)	41529148.00	429026
a) From Government of India	49537464.00	33658893	IV. Expenditure on Fixed Assets & Capital Work-in-Progress		
b) From State Government			a) Purchase of Fixed Assets	14257941.23	6869113
c) From Other sources (details) (Grants for capital & revenue exp. to be shown separately)	496095.00	228848	b) Expenditure on Capital Work-in-Progress		
III. Income on Investments from			V. Refund of surplus money/Loans		
a) Earmarked/Endowment Funds			a) To the Government of India	41263.74	71195
b) Own Funds (Other Investment)			b) To the State Government		60622
IV. Interest Received			c) To other providers of funds		60622
a) On Bank Deposits	1992121.00	180648	VI. Finance Charges (Interest)		
V. Other Income (Specify)	75438.20	152698	VII. Other Payments (Specify)	2846640.85	1456584
VI. Amount Borrowed			VIII. Closing Balances		
VII. Any other receipts (give details)	1213628.30	487755	a) Cash in hand	4410.35	4731
VIII. Amount transferred to Current Account from Deposit Account	41529148.00		b) Bank Balances :		
			i. In current accounts	247981.34	2834868
			ii. In deposit accounts	16225073.99	
			iii. Savings accounts		
	<u>107246894.44</u>	<u>36354590</u>		<u>103327392.27</u>	<u>36354590</u>

Kolkata  
Dated : 05.08.2003

Sd/-  
**S. Dattagupta**  
Director

S. N. Bose National Centre for Basic Sciences

Sd/-  
**D. C. Banerji**  
Acting Administrative Officer

S. N. Bose National Centre for Basic Sciences

Sd/-  
**U. Roychoudhuri**  
Partner  
For ROY & BAGCHI  
Chartered Accountants



विज्ञानेन परिपश्यन्ति धीराः

**S. N. BOSE NATIONAL CENTRE FOR BASIC SCIENCES  
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