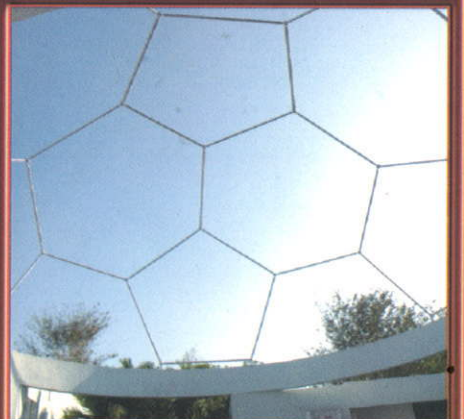
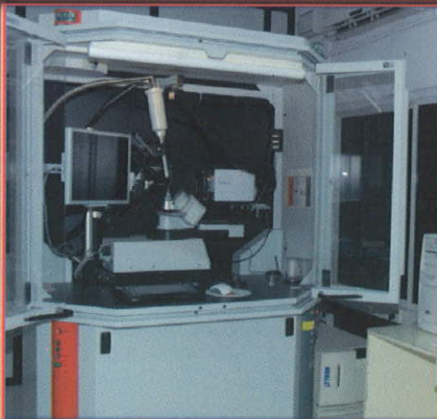




JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH

JAKKUR, BANGALORE – 560 064

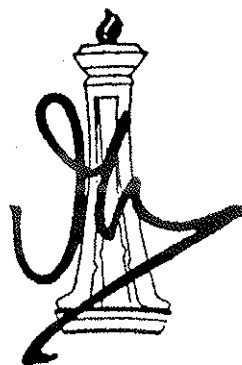


ANNUAL REPORT 2006-2007



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2006-2007



**JAWAHARLAL NEHRU CENTRE FOR
ADVANCED SCIENTIFIC RESEARCH**

(A Deemed University)

Jakkur, Bangalore – 560 064.

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The Centre

Foreword

It gives me great pleasure in presenting the Seventeenth Annual Report of the Centre for the year 2006-2007.

The Centre is one among the leading institutions in the country for higher learning and research in frontier areas of science and engineering. The Centre has also been recognized as a Deemed University. During the year, significant contributions have been made in research areas of material sciences, theoretical physics, molecular biology and genetics, evolutionary and organismal biology, chemical biology, engineering mechanics and geodynamics. The Government of India has placed Centre as one of the top institutions in the country, in the recent evaluation of all the scientific institutions conducted by them. Faculty colleagues and students are being recognized and honoured with distinctions, both nationally and internationally. Our distinguished colleague, the Founder President and Linus Pauling Research Professor and National Research Professor, Prof C.N.R. Rao, has been honoured with the Fellowship of the University of Oxford, the only Indian scientist to receive this distinction. It is also heartening to note that several of the research findings in materials science and biology have been converted to potential technologies which have now been patented. The Centre's efforts to attract young faculty members to join different Units of the Centre resulted in recruiting three faculty members during 2006-2007.

The publication statistics have shown very impressive progress and during the year 225 papers have been published in international and national peer reviewed journals. 28 students have obtained Ph D Degrees; 6 students M S (Engg.) and 5 students M S (Int. Ph D) degrees after obtaining the status of Deemed University. The students strength has been steadily increasing, keeping the academic activities as vibrant as ever. With the admission of 29 students for various programmes, the present student strength is 119.

Several new initiatives like nanoscience and computational material sciences have taken root in the Centre with substantial support from DST. Various infrastructural facilities have also been upgraded to cope up with the increased activities at the Centre. The proposal of the Centre for establishing an International Centre for Materials Science has been approved by the DST. A new programme of Integrated Ph D in Materials Science will be started from the academic year 2007-08.

In addition to pursuing research in various contemporary areas, the Centre also has several Science Outreach Extensions and Fellowship Programmes. One such activity is the Summer Research Fellowship Programme for young students. During the year, 5,866 applications were received, out of which 136 were offered fellowships, in addition to 39 selective renewals from the previous year. This is one of the highly acclaimed programmes and the students are very appreciative of the benefits, enabling them to get inspired towards scientific research during early stages of their education. Honorary Faculty Members of the Centre have made significant contributions to the various academic and research programmes of the Centre. We acknowledge their participation in training young students under the Summer Research Programme.

The Project Oriented Chemical Education (POCE) programme has successfully completed three years, bearing an impact in the student community. The first batch of POCE students have completed their 3 year POCE course during July 2006. Ten meritorious students from across the country have been selected for this year. As part of their on-going programme, five students of POCE worked with faculty members at the Centre on small projects during their mid-semester break. Two students of POCE-2005 (along with colleagues in JNC) have published research papers in international journals. Now in its fourth year, this programme has attracted more attention across the country and the students undergoing this programme have highly appreciated its structure and content.

A similar programme in Biology (POBE) has successfully completed its first year and 10 students from across the country have been selected.

The JNC Research Conference in Chemistry to facilitate detailed discussion on contemporary areas of interest was started in 2005 and a similar programme is being planned in the area of biomedical science during the next year.

The Centre continues to provide an excellent academic atmosphere for intellectual interaction and pursuit of knowledge which is the result of untiring efforts of students, the faculty and honorary faculty and other members of the Centre. I take this opportunity to thank and acknowledge the enthusiastic help the Centre has received from its well wishers and friends and look forward to their continued cooperation. The Department of Science & Technology has always positively supported all the academic and developmental activities of the Centre which is greatly appreciated and thankfully acknowledged.

MRS RAO
President

INTRODUCTION

The Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore, a premier research institute in the country, was established in the year 1989, the birth centenary year of Pandit Jawaharlal Nehru, by the Department of Science and Technology. The objectives of the institute shall be to pursue and promote scientific research and training at the highest level in the frontier and interdisciplinary areas of science and engineering. The number of publications in international journals of repute and the filing of patents is steadily increasing year by year. The Centre, which is just Seventeen years old, is creating news regularly in the scientific world with its breakthrough discoveries. The Centre has collaborations with several national and international institutions. In recognition of the achievements of the Centre, the Ministry of Human Resource Development (GOI) has accorded it the status of a Deemed University, to enable the Centre to train quality manpower. The faculty members of the Centre have received national and international recognition. Several faculty members of the Centre are Fellows of National and International science and engineering academies.

Prof. C N R Rao, the founder of the Centre, held the office of President from 1989 to 1999. He is presently the Honorary President of the Centre and Chairman of the Scientific Advisory Council to the Prime Minister. Prof V Krishnan, who succeeded him, served as its President from 2000 to 2003. Prof M R S Rao is presently the President of the Centre.



OBJECTIVES

The objectives of the Centre are:

- Y To carry out front-line research in selected thrust areas of science and engineering;
- Y To promote collaborative research with scientists at the Indian Institute of Science and other institutions in the country;
- Y To provide a national and international forum for in-depth discussions on important scientific topics in areas of vital interest to scientists of the Centre and in the country at large;
- Y To organize periodic winter and summer schools in certain areas, where young talented scholars would be associated;
- Y To provide opportunities for talented young students to carry out research projects;
- Y To provide facilities to visiting scholars and faculty, from all over India and abroad, to work for extended periods with the faculty of the Centre;
- Y To publish monographs and reports on frontier and futuristic areas of science as well as monographs of educational value.

PROGRESS

The Centre has completed seventeen years with several memorable and exciting moments. The main campus at Jakkur now houses the Chemistry and Physics of Materials Unit, Educational Technology Unit, Evolutionary and Organismal Biology Unit, Engineering Mechanics Unit, Geodynamics Unit, Molecular Biology and Genetics Unit, and Theoretical Sciences Unit. The Chemical Biology Unit and the Condensed Matter Theory Unit are located at the IISc Campus which also houses the Centre's Administrative Office with a seminar hall, a well-furnished accommodation for academic visitors and a Visitor House for students and R & D assistants. New Faculty appointments have been made in some research areas. While the new Nanoscience Centre, equipped with the state-of-the-art facilities for advanced research in materials science has been fully functional, new building for Engineering Mechanics Unit and International Centre for Materials Science will be ready over the next couple of months, and more buildings are planned. Various state-of-the-art infrastructural facilities were upgraded to be commensurate with the increased activities at the Centre.

The Centre has the privilege of having a good quality Library, excellent Computer Laboratory, Centre for Computational Materials Science, Lecture Halls, a Chemical Education Laboratory, a Conference Hall, a Seminar Hall, a Poster Presentation Hall, Faculty Offices and the Administrative Office.

The Centre pursues excellence in research and education in frontier and interdisciplinary areas of science and engineering. It provides a stimulating academic environment to talented and motivated students to pursue scientific research. The students strength as on 31st March 2007 was 119. The research training at the Centre has led to the award of 35 Ph D degrees, 16 M S degrees, 6 M S (Engg.) degrees and one M Sc (by research) degree so far.

Reforms have been introduced in Research Admissions procedures to maintain high quality research training programmes at the Centre. The Centre continues to be at the forefront of cutting edge science and engineering research in the country.

The Centre has emerged as a place for interdisciplinary research, with effective interactions among scientists with backgrounds in biology, chemistry, engineering and physics. The JNC community has been working not only in pursuit of research, but also on dissemination of science-related activities reaching out to the common man.

The Computing Facility and Instructional Computing Laboratory of the Centre for Computational Materials Science (CCMS) at the Centre have been inaugurated.

The Centre's faculty have received a number of national and international recognitions. Prof C N R Rao, Linus Pauling Research Professor and National Research Professor, has been honoured with the Fellowship of University of Oxford, the only Indian scientist to receive this distinction, Doctor of Science (Honoris Causa) from University of Stellenbosch, South Africa, India Citation Laurate 2006 (Thomson/ISI, USA), and Honorary Fellowship by Institute of Physics, London. Prof M R S Rao, President, received the Sir M Visvesvaraya Scientists Award of Government of Karnataka for the year 2004 and Dr A Govindaraj received Dr CV Raman Young Scientist Award for 2005. Prof S Balasubramanian received the Swarna Jayanti Fellowship. Prof K S Valdiya has been conferred with Padma Shree by the Govt. of India. Prof M K Chandrashekar received the Millennium Plaque Honour by the Indian Science Congress Association. Prof Umesh V Waghmare has been awarded with Birla Science Prize and Prof N Chandrabhas has been awarded with MRSI Medal-2007.

The Faculty of the Centre have published approximately 200 scientific papers in reputed international journals during the year 2006-07.

The following patents were filed by the faculty members during the past year.

- National Phase Patent Applications have been filed at USA and Europe for the invention titled *Polyisoprenyl Benzophenones as Inhibitors of Histone Acetyl Transferases and Uses Thereof*. Inventors: Prof Tapas Kumar Kundu, Dr K Balasubramanyam
- Indian patent complete specification application and International Patent Application (PCT) have been filed for the invention titled: *Derivatives of 4,6-disubstituted 1,2,4-Triazol-1,3,4-Thiadiazol - a process and uses thereof*. By JNCASR and University of Mysore. Inventors: Prof Tapas Kumar Kundu, Prof K S Rangappa, et al.
- Indian Provisional Patent Applications have been filed for the following new inventions: (a) *A Highly Specific Human Polyclonal Beta Actin⁷ Antibody and its uses thereof*. Inventors: Prof Tapas Kumar Kundu, et al. (b) *Polyhydroxy Derivatives of 12,3,7,8-tetra-hydroxyl(1) Benzopyrano(5,4,3,(DE)(1) Benzopyran 5,10-dione) as a novel, specific inhibitors of Histone methyltransferase (HMTase) and its uses thereof*. Inventors: Prof Tapas Kumar Kundu, et al. (c) *A high sensitivity assay for molecular typing of biological samples using Surface-Enhanced Raman Scattering*. Inventors: Prof Ranga Uday Kumar et al.

The Centre is actively pursuing interaction with academic institutions and universities globally. The Centre has been expanding its formal ties with other international and national research organizations and Universities by signing MOUs for collaborative research, exchange of graduate students and consultancy projects.

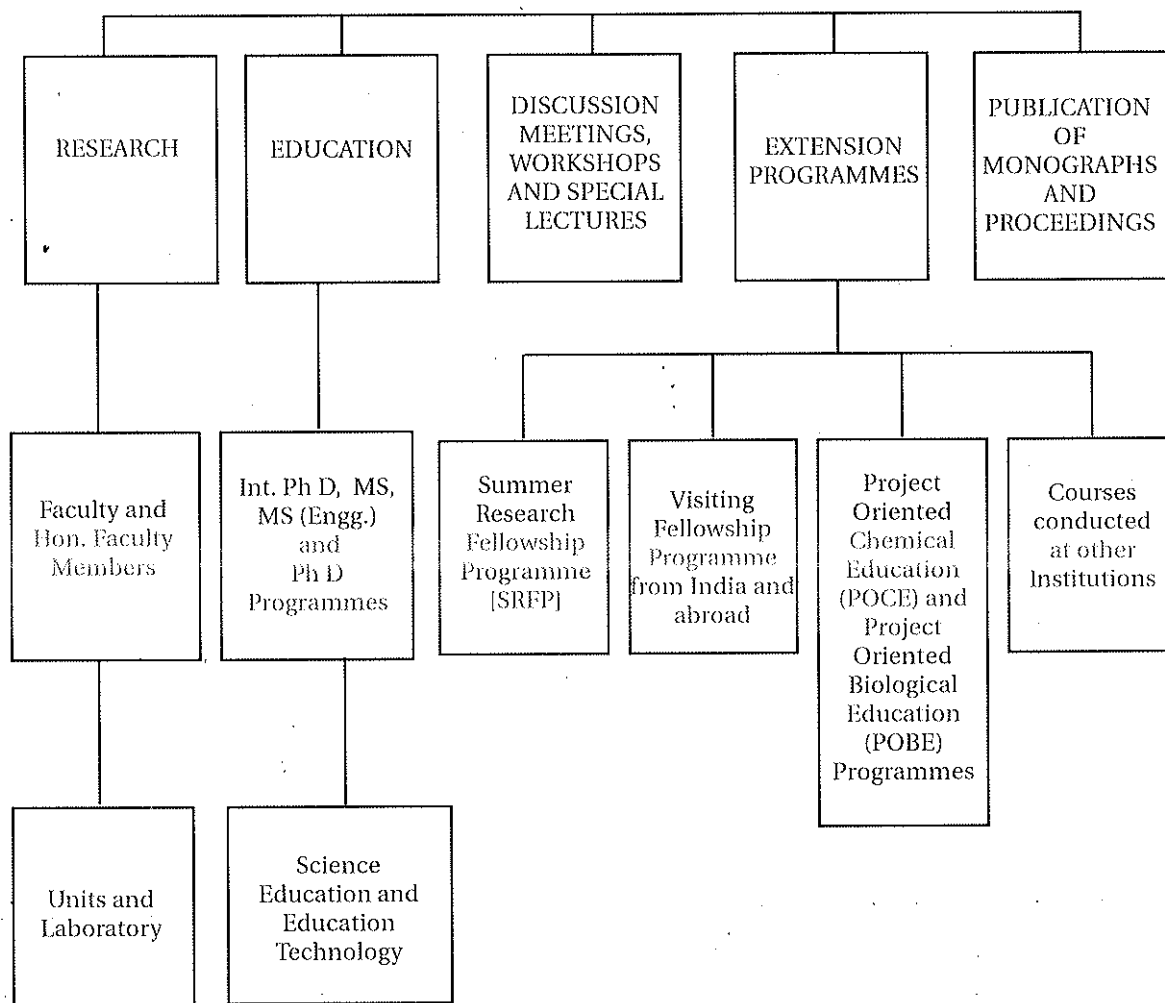
Honorary Faculty Members of the Centre have continued to play an important role in guiding academic and extension activities of the Centre. The campus is lively and vibrant with active support from administrative and scientific staff.

Summer Research Fellowships, Project Oriented Chemical Education Programme, Project Oriented Biological Education Programme, Visiting Fellowships, Extension Programmes and Academic Exchange Programmes of the Centre have attracted wide attention and were highly successful. The new Postdoctoral Fellowship Programme in Nano Science and Technology funded by DST was also successful. Nine candidates from R & D institutions have been offered Visiting Fellowships for 2006-2007. Nine candidates have been offered DST Postdoctoral Fellowships in Nano Science and Technology for 2006-2007.

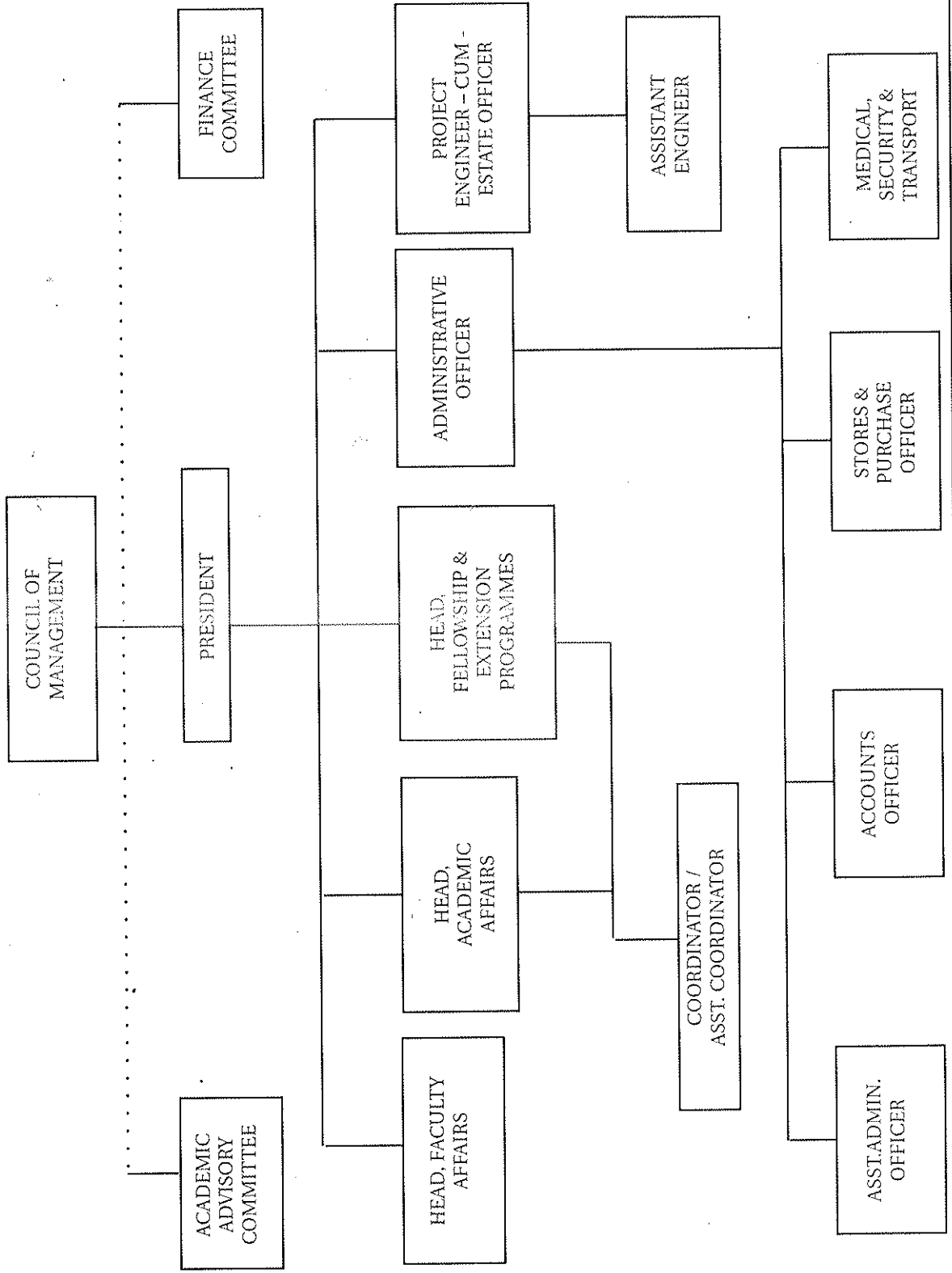
Since April 2006, 31 Discussion Meetings/Workshops were conducted, either wholly or partially supported by the Centre. In addition, about 55 seminars, 12 Fluid Dynamics Colloquia and 4 International Conferences were also held at the Centre.

ACTIVITIES CHART

JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH



ORGANISATION CHART



THE ORGANISATION

1. Council of Management

The administration and management of the affairs and finances of the Centre are conducted by the Council of Management. The Council of Management of the Centre meets twice a year.

The following are the members of the Council.

P. Rama Rao ISRO Brahm Prakash Distinguished Professor, ARCI, Hyderabad	Chairman
M R S Rao President, JNCASR	Member
T Ramasami Secretary Department of Science and Technology New Delhi	Member
C N R Rao Linus Pauling Research Professor JNCASR	Member
S K Joshi National Physical Laboratory New Delhi	Member
K P Pandian Joint Secretary & Financial Adviser Department of Science and Technology New Delhi	Member
P Balaram Director Indian Institute of Science, Bangalore	Member
Sinha, B Director, VECC & Saha Institute of Nuclear Physics Kolkata	Member
S Chandrasekaran Indian Institute of Science Bangalore	Member
A N Jayachandra Administrative Officer, JNCASR.	Secretary

2. The Finance Committee

The Finance Committee of the Centre scrutinizes all financial proposals, and makes recommendations to the Council of Management.

The constitution of the Finance Committee is as follows:

M R S Rao President, JNCASR	Chairman
C N R Rao Linus Pauling Research Professor JNCASR	Member
K P Pandian Joint Secretary & Financial Adviser Department of Science and Technology New Delhi	Member
S Chandrasekaran Indian Institute of Science Bangalore	Member
Revathi Bedi Finance Officer, JNU New Delhi	Member
R S Gururaj Accounts Officer, JNCASR	Member
A N Jayachandra Administrative Officer, JNCASR	Secretary



3. The Academic Advisory Committee

The functions of the AAC include planning, execution and coordination of research and other academic activities of the Centre. It also regulates the courses of study, procedure for admission of students, examination, etc. It meets at least twice a year. The Committee makes its recommendations to the Council of Management

The members of the Committee are :

M R S Rao President, JNCASR	Chairman
C N R Rao Linus Pauling Research Professor JNCASR	Member
A K Raychaudhury Director, SNB NCBS, Kolkata.	Member
Dipankar Chatterji IISc., Bangalore.	Member
Rahul Pandit IISc., Bangalore	Member
P Ramachandra Rao Director, Institute of Armament Technology, Pune	Member
M K Chandrashekar Head, Faculty Affairs, JNCASR	Member
K VijayRaghavan Director NCBS, Bangalore	Member
K S Narayan Head, Academic Affairs, JNCASR	Member
Rama Govindarajan Head, Fellowships & Extn. Programmes, JNCASR	Member
A N Jayachandra Administrative Officer, JNCASR	Secretary

4. Faculties

The faculties are involved in the academic activities of the Centre and assist the Academic Advisory Committee in discharging its functions. The last Annual Faculty Meeting was held in November 2006 which included lectures by the faculty on the advances made in various research areas. Local faculty meetings were held in August 2006 and February 2007 to review the progress and provide inputs wherever required.

5. Administration

President

M R S Rao, Ph D (IISc), F A Sc, F N A, F N A Sc, F T W A S

Head, Faculty Affairs

M K Chandrashekar, Ph D (Madras), D Sc (MKU),
F A Sc, F N A, F T W A S

Head, Academic Affairs

K S Narayan, Ph D (Ohio State Univ.), F N A Sc

Head, Fellowships and Extension Programmes

Rama Govindarajan, Ph D (IISc), F N A Sc

Warden & Student Counsellor

Hemalatha Balam, Ph D (IISc) (upto 28.2.2007)
Umesh V Waghmare, Ph D (Yale Univ.) (from 1.3.2007)

Associate Warden

S Balasubramanian, Ph D (IISc) (upto 28.2.2007)
Maneesha S Inamdar, Ph D (TIFR) (from 1.3.2007)

Administrative Officer

A N Jayachandra, B Com (Mysore), ICWA (Inter)

Assistant Administrative Officer

G Jayaram, B Com (Bangalore)

Assistant Coordinator

Princy Jaison Pereira, Ph D (Gujarat)

Accounts Officer

R S Gururaj, B.Sc. (Mysore) M P Ed (Bangalore)

Stores & Purchase Officer

K Bhaskara Rao, M Sc (Hyderabad), M Phil (New Delhi)

Senior P A to President

A Srinivasan, B A (Hyderabad)

Project Engineer

S Chikkappa, B E (Mysore)

Junior Engineer (Civil)

Nadiger Nagaraj, DCE

Junior Engineer (Elec.)

Sujeeth Kumar S, DEE

Chief Medical Officer

B S Subba Rao, MBBS (Mysore)

Consulting Lady Medical Officer

Kavitha Sridhar, MBBS (Bangalore)

Honorary Medical Officers

G R Nagabhushan, MBBS (Mysore), FCCP, FCGP, P G Dip in
M&CH
L Sharada, MBBS (DGO (Madras))
R K Nivedita, MBBS (Mysore)
C Satish Rao, MBBS (Mysore)

Honorary Security Officer

M R Chandrasekhar, B Sc, LL B (Bangalore)



UNITS, COMPUTER LABORATORY AND ENDOWED RESEARCH PROFESSORS

1. Chemistry and Physics of Materials Unit

Novel methods and new materials

Chemical approaches have emerged as the preferred means to synthesize nanostructures such as nanocrystals, nanowires, nanotubes and nanowalls of several inorganic materials due to superior control over size, shape and surface functionality. Nanocrystals of pure CoO and ReO_3 have been synthesized, for the first time, employing a one-pot solvothermal technique. Nanocrystals of metals such as Ru, Rh, Ir, Ni and oxides like MnO, NiO, RuO_2 and IrO_2 have also been prepared. Nanostructures of the binary nitrides, BN, TiN, and NbN have been prepared using the urea-route. Inorganic nanowires and nanotubes have been prepared using templates like anodic alumina membranes and hydrogels. Improved synthesis of carbon nanotubes with junctions as well as of inorganic nanowires has been achieved. Aligned Zn-Al spinel oxide nanorods of 150 nm diameter were prepared using polycarbonate membrane as the template. Amorphous carbon nanotubes attached with functional groups were also prepared by carrying out glucose carbonization in the pores of a polycarbonate membrane. These aligned nanotubes were successfully utilized as templates to make Ga_2O_3 , GaN, ZnO and Al_2O_3 nanotubes. Based on electroless deposition, nanogranular Au films as well as island nanostructures have been made.

Liquid-liquid interface has also been used in the preparation of freestanding films of various metals and semiconductors. By using fluorosurfactant chemistry, solubilization of various nanostructures such as Au and CdSe nanocrystals, single-walled carbon nanotubes and ZnO nanorods in the most nonpolar liquid medium has been made possible. BN nanotubes have been solubilized in hydrocarbons using Lewis bases such as trioctylamine and trioctylphosphine. Dispersion of inorganic nanowires in polar solvents has also been studied.

GaS and GaSe nanowalls and nanotubes have been obtained through exfoliation by laser irradiation and thermal treatment. Laser ablation has been employed to produce ZnO nanopillars as well as cup-like metal nanostructures. Thin films of $\text{Cu,C-Ba}_2\text{CuO}_{4+y}$ were prepared with superconducting transition temperature around 40 K. The films form the basis for the preparation of superlattices of BaCuO_2 and CaCuO_2 with superconducting transition temperatures higher than 100 K.

High temperature and pressure synthetic methods have been applied to synthesize compounds such as BaIrO_3 , Ca_2IrO_4 , Sr_2RhO_4 etc that exhibit interesting crystal structures. Design and synthesis of microporous materials of metal-organic coordination network compounds (MOCNs) have been carried out exploiting the bridging potentials of the different organic linkers involving different metal ions (such as Mg(II), Al(III)). These materials important applications in gas storage as they possess porosity and high thermal stability.

Properties

Optical spectroscopic studies on composites of conducting PANI with CdSe and ZnO nanocrystals has been carried out. Nanocrystals of In- and Mn-doped GaN nanocrystals have been synthesized and their optical and magnetic properties have been studied respectively. A study has been carried out to tune emission bands of nanophosphors by changing refractive index of the dispersing medium. The mechanical properties of poly(vinyl alcohol) matrix composites incorporating SiC and Al_2O_3 nanowires have been investigated. A marked increase in the elastic modulus (up to 90%) has been observed even with the addition of a small quantity (0.8 vol%) of nanowires. Field emission properties of boron and nitrogen doped carbon nanotubes have been investigated. Sensors with high sensitivity and low recovery time for humidity, H_2 , ethanol, carbon monoxide, cooking gas (LPG), NO_2 , NO and N_2O have been fabricated using various metal oxides nanostructures. Magnetic properties of several non magnetic oxides at the nanoscale

have been investigated. Nanoparticles (7 - 30 nm dia) of CeO_2 , Al_2O_3 , ZnO , In_2O_3 and SnO_2 were found to exhibit ferromagnetism at room temperature in contrast to the sintered samples. Nanorotor action of optically trapped asymmetric inorganic nanorods has been studied. Superconducting properties of $\text{g-Mo}_2\text{N}$ and d-MoN have been investigated.

Light Scattering Laboratory has carried out research in Brillouin Scattering and Raman studies on host of novel materials. A patent application has been filed based on the findings of a novel method to classify the recombinant HIV virus. The SERS studies on Bio systems initiated in 2005, has produced very important results, especially in the field of interaction of small molecules with protein.

The Molecular Simulations group was involved in carrying out several simulation studies of supercritical carbon dioxide and ionic liquid solutions. Ab initio MD simulations of scCO_2 under different pressures revealed a close similarity in the intermolecular structure of this solvent with the CO_2 crystal. The interaction of CO_2 with ionic liquids, an important problem in industrial chemistry of separation processes was also investigated using such simulations.

* *Device Physics and Photophysics*

The Molecular Electronics/Organic Electronics group has been actively involved in studying electronic, optical and optoelectronic phenomena and exploring device structures in polymeric/organic/nano and biomolecular based systems over the last decade. Current research activities include (i) photophysical studies of optically active soft-matter using a innovative combination of microscopy and spectroscopy methods (ii) Fabrication of field effect transistors; light emitting diodes and solar cells (PV) devices (iii) Large area patterning methods which includes studying and manipulating elastic/viscoelastic surface instabilities (iv) Photo-induced charge transport processes in membrane-protein/smart electrode systems (v) Modifying carbon nanotube transistors by controlling its environment. Polymers/organics are now attractive materials for active components in opto-electronic devices, flat-panel displays, solar cells and sensors besides being model systems for studying correlated phenomena in low-dimensional systems.

Some of the noteworthy contributions to this research community and inventions are: (a) Polymer-Photo Field Effect Transistors (b) Efficient plastic solar cells (c) Synergistic Processes at bacteriorhodopsin-conducting polymer interface (d) flexible polymer based light- position sensor spanning sub-micron to few mm range (e) High resolution photocurrent imaging for estimating transport length scales and identifying active regions.

New programmes launched:

An exchange program between CPMU and AIST, Tsukuba, Japan was established to work on the synthesis of multiferroic materials under high pressure and high temperature. One faculty and one student visited AIST for a month under this program. A Micro Brillouin setup is being made to facilitate study of elastic properties in micro and nano samples.



The following are the members of the Unit

Chair

C N R Rao Ph D, D Sc, F A Sc, F N A,
F R S, F T W A S, Hon F R S C

Professor

K S Narayan Ph D, F N A Sc.

Associate Professors

S Balasubramanian Ph D

N Chandrabhas Ph D

G U Kulkarni Ph D

Faculty Fellows

M Eswaramoorthy Ph D

A Sundaresan Ph D

Tapas Kumar Maji Ph D

Fellows

N S Kini Ph D

K Ramesha Ph D

Technical Officers

V Sreenath (BE), S Srinivas (BE), Usha Govind Tumkurkar (M Phil)

Lab Assistants

J Anil Kumar (DEE), B S Vasudev (BE), Basavraj Devaramani (BE),
Alla Srinivasa Rao (BE)

Research Associates

Prabhakar Rao K, Vasuda Bhatia, Ujjal K Gautam (P)

Research Fellows

Asish Kundu, Kripa Sindhu Sardar, Meenkashi Dan,
Md. Motin Seikh, Moumita Ghosh,

Application Scientist

Kiran Ashokrao Kulkarni

Technical Assistants

Amit Kumar Patel, N R Selvi

R & D Assistants

Ande C Krishna, Aniket Arvind Kulkarni, Gurunatha K L, Hemant
Marthand Dixit, Jasmeet Singh Chawla, Jyotirmayee Kanungo, Madhu C,
Manu Hegde, Narayanaih Cheedarla, Pearl Loraine Saldanha,
Rajashekarayya, Shashikiran B S, Sheeba Jem I, Vishnuvardhana Reddy

Programme Assistant

K Venkatesh

2. Education Technology Unit

The Unit is actively involved in the concept, design execution and production of the Gold master CD-ROM's in various disciplines of science essentially addressing school children. The Unit always considers the experiences of the end-users in actively revising the pre-existing CD-ROM's to make the learning experience easier for school children and more user-friendly for teachers to use these as reference material.

This has been achieved by introducing greater interactivity and splitting the bigger topics into smaller theme-based topics to highlight the concepts. In view of the increasing demand for these CD-ROM's from various institutions like the CSIR, National Science Museums, the Press and others, the unit undertook revision of the CD-ROM title Learning Science volume 1 & 2.

In addition to developing and producing the Gold master CD-ROM's, the unit has also produced informative pamphlets highlighting the various features, listing the different topics and subtopics with adequate pictorial representations. A brief write-up of the authors was also included along with information on the availability of these CD-ROM's.

The Four parts of the series 'Learning Science' was handed over for printing and distribution to the National Book Trust. Also, the Kannada version of the books Learning Science series titled 'Vignyana Kaliyona' 'Samputa - 1 to 4' were edited and corrections, suggestions incorporated for them to be brought out by National Book Trust.

The success of bringing out CD-ROM's and books on Learning Science authored by Prof. C.N.R. Rao and Mrs. Indumati Rao is that it has caught international attention. The Unit has been requested for translation of these books to several foreign languages for the benefit of school children in those countries.

On-going Projects

As per the suggestions from end-users it was decided to review and revise the earlier titles like 'Understanding Chemistry' and 'Our Earth in the sky' with enhanced interactivity, addition of more information in the content, making the CD-ROM's more user-friendly.

The revision essentially involves providing additional information about terms, concepts etc. by providing 'Hotspots' within the script. Also the topics in different modules are split into smaller sub-topics for easy viewing.

The Unit has organized many science popularization programs in various parts of the country. The Hindi translation and production of the Learning Science multimedia series in Hindi was taken up by ETU.

Organisation of Programs

ETU has organised various science popularization programs both for school children (urban & rural) and also workshops for teachers.

On 22 May 2006, ETU organized the program 'Learning Science' for various branches of the Delhi Public School teachers and students. Prof. C N R Rao gave the theme lecture. 'Learning Science'. This was followed by a 45 minutes multimedia presentation of excerpts from the CD-ROM's Learning Science Vol. 1 & 2 in English. A lecture on DNA and demonstration of simple experiments was also carried out.

In the program on Project Oriented Chemical Education, for undergraduate college students, a multimedia presentation from the CD-ROM 'Understanding Chemistry' was presented by the Unit in May-June 2006.

ETU organized a Teacher's Day Celebration Program on 19th September 2006 for Science Teachers from all over Bangalore (North, South and Rural). Prof. C.N.R. Rao addressed the gathering followed by multimedia presentation of excerpts from different topics of 'Learning Science vol. 1 & 2'. A demonstration of experiments was done by some of the Centre's faculty. All the teachers were presented with a copy of the Learning Science Part 1 to 4.



The popular Learning Science program was conducted at Defence Institute of Advanced Technology, Pune, on 6th January 2007 and at the Amrita Institute of Medical sciences on 17th February 2007. A multimedia presentation of excerpts from the CD-ROM 'Learning Science' was presented by the Unit at all the above programs. In the program 'Learning Science' Prof. C. N. R. Rao gave the theme lecture.

As part of National Science day celebrations, on 28th February 2007, Mrs. Indumati Rao gave a lecture on 'Global Warming and Climate change'. ETU presented a multimedia presentation on the same theme from excerpts of the CD-ROM's 'Learning Science' volume 1 & 2. 1000-2000 students attended these programs.

The following are the members of the Unit:

Incharge V Krishnan	Ph D, F A Sc, F N A, FTWAS
Coordinator (Hon) Indumati Rao	MA, M S, C E
Technical Officer Jatinder Kaur	M Sc
Multimedia Asst. (Hon) Sanjay Rao	B Sc, Cert. Multimedia

3. Engineering Mechanics Unit

Aerospace fluid dynamics

Several studies related to transition on swept wings were completed during the year. It was discovered that, at high angles of attack corresponding to take-off and landing conditions on an aircraft, several transitions (six in one case) from laminar to turbulent flow and back can occur within the first 15% or less of the chord of the aircraft's wing. A separate investigation shows that one reason for quick reversion to laminar flow at a swept leading edge is the combined effect of high favourable pressure gradients and high convex curvature. These studies have shed light on the anomalous behavior of the maximum lift coefficient of a wing at flight Reynolds numbers. The work was carried out in collaboration with scientists at NAL and at Boeing R&D, Seattle WA.

Novel, robust algorithms with rotational symmetry and low dissipation have been developed. The gridfree solver LSKUM has been combined with an evolutionary algorithm for aerodynamic shape optimization. An LSKUM-Moving Node algorithm has been developed jointly with Dr.V Ramesh, NAL, for predicting flutter of turbine blades.

Geophysical fluid dynamics

In connection with flows of geophysical interest, a new 'buoyancy-driven' instability mode and a related 'frequency-filtering' mechanism in a plane thermal plume have been identified. In supersonic Couette flows, it has been shown that the choice of the constitutive model has large effects on flow-stability in terms of both modal and non-modal stability analyses. Unlike in incompressible shear flows, we have shown that two well-known scaling laws for transient energy growth do not hold in compressible plane Couette flow.

A detailed study of atmospheric measurements of momentum flux near the surface has led to an episodic description of turbulent flux processes at very high Reynolds numbers. Many characteristic parameters of the corresponding flux 'episodes' or events, including their intensity, duration and occurrence times, have been analysed, and scaling laws for the parameters have been proposed.

The nocturnal atmospheric phenomenon of the lifted temperature minimum (LTM) is being studied both in the field and under controlled conditions in the laboratory. The effect of ground emissivity and heat capacity of the ground on the LTM has been demonstrated. The formation of LTM and the effect of "ground-reflectivity" on the phenomenon have been studied in the lab.

Complex Fluids

An analytical study of the orientation dynamics of axisymmetric particles in rapid shearing flows is being carried out. The results will enable insight into the effects of micro-scale inertia on the rheology of suspensions of anisotropic particles.

An analytical study of the role of micro-scale inertia on the heat transfer from both particles and drops suspended in shearing flows is being carried out. Heat transfer in these instances is crucially enhanced by inertia by destruction of a region of closed streamlines that persists around the particle or drop in inertialess conditions.

An analytical-cum-numerical study of the role of hydrodynamic interactions in a large sedimenting cluster of particles has been under-taken. Inertia is found to lead to a regime of self-similar expansion with the cluster radius increasing as the cube root of time. A simulation protocol is being developed to verify this analytical prediction.

Biomechanics

A numerical study of pair-hydrodynamic interactions between swimming bacteria is ongoing, leading to the prediction of the pair-distribution function in a dilute bacterial suspension. This will be a first step in understanding the role of hydrodynamic interactions in the collective dynamics of bacterial suspensions.

It has been shown by flow visualization and 2-D vortex simulations that a simple flapping kinematics in which ratio of down-stroke to up stroke time periods is lower than 0.7 can produce sustained lift.



Granular Media

A hydrodynamic theory for the segregation of granular materials (Brazil-nut phenomenon) has been developed. It has been shown that the shearbanding phenomenon in granular flows can be described by a Landau-type equation which has been derived from the continuum equations of granular flows. Using large-scale simulations on granular Couette and Poiseuille flows, it has been shown that the dissipation-induced correlations play an important role for the emergence of non-Gaussian velocity distributions. The validity of a possible 'multipolar' description of rough granular materials is currently being probed. This work has a direct link with the modelling of active particles which is another focus of our current work.

An algebraic instability has been identified in the shear flow of micropolar granular fluid. This instability is tied to the transfer of momentum from the translational degrees of freedom to their rotational counterparts. In terms of asymptotic instability, it has been shown that a micropolar granular fluid is more unstable than its smooth, elastic counterpart, and the added rotational dissipation of granular energy is responsible for this instability. Some of the instabilities in granular shear flow have been tied to 'constitutive' instability, and the loss of hyperbolicity of the underlying field equations is tied to the onset of such instability.

Another project (Max-Planck-India Partner Group, with Dr. Khalili, MPI-Bremen) deals with sediment transport and topography formation on sea-bed. In connection with this project, a simple model has been developed for pattern formation in an oscillatory fluid-particle suspension.

Small-scale flows

In small-scale flows, a group in the CPMU, JNCASR was able to form metal cups of femto-litre capacity by impinging droplets of molten metal on a hot substrate. An explanation for this has been suggested in the form of a hydraulic jump caused by surface tension alone. All earlier work on hydraulic jumps have included gravity as the driving force.

Stability

The stability of a mixing layer (created by two parallel streams at different velocities coming into contact with each other) was studied. In all earlier work, the critical Reynolds number for a mixing layer was found to be the unphysical value of zero, impossible from energy considerations. A non-parallel analysis has led to a finite non-zero critical Reynolds number. When defined using the vorticity thickness, this number is not sensitive to the ratio of the velocities of the two streams.

An old but large discrepancy between experimental and theoretical results on flow stability in the entry region of a pipe is addressed. It is shown that by taking non-parallel effects into account, a critical Reynolds number close to the experimental value could be obtained.

In heated channel flow, a large transient growth of instabilities where the structures are aligned perpendicular to the flow is found. Earlier transient growth studies on other flows have always revealed structures parallel to the flow.

Stability and bifurcation techniques have been applied to systems in fluid mechanics. Symmetry is invoked in a representative Hamiltonian system to obtain the periodic solutions and the equilibria. The numerical aspects of solving the equations by treating the fluids as discrete is an exciting area and is the current focus of interest. The simplistic nature of the numerical algorithms is illustrated.

A novel instability in a bacterial suspension was discovered that is expected to play an important role in determining the level of velocity fluctuations in these systems. The instability arises from the intrinsic stress associated with a swimming bacterium, which for long wavelengths, acts as a negative viscosity.

Turbulent flows

Digitized imagery acquired in laboratory simulations of cloud-like flows have been analysed to yield the life cycle of a coherent structure in a turbulent jet. This has been possible through the creation, for the first time, of wavelet movies at relevant spatial scales.

An analytical study of the structure of elastic vortices at high Reynolds number is being carried out in order to understand the multi-scale structure of turbulence in dilute polymer solutions.

A facility has been developed to study the wake of self propelled and towed bodies in a stratified medium. Provision exists to study these wakes over a range of Froude and Reynolds numbers and advance ratios, using salinity probes, shadowgraph and dye flow visualization. NPOL-Cochin (DRDO) is funding this project.

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Saritha Azad, Sikata Samantaray.



4. Evolutionary and Organismal Biology Unit

The Evolutionary & Organismal Biology Unit (EOBU) is one of the most active research groups in the country in the broad fields of evolution, ecology and behaviour, with extensive facilities for routine *Drosophila* work, as well as computational, physiological, behavioural and molecular investigations of fundamental questions in organismal functional biology. The Unit also houses the largest insect activity recording system in the world, with over 1000 channels.

During the year 2006-07, faculty of the Unit were involved in ongoing research projects on (a) behavioural, neurobiological, molecular and evolutionary aspects of circadian clocks in fruitflies and ants, (b) life-history evolution in *Drosophila*, and (c) theoretical and experimental studies of small population and metapopulation dynamics. In particular, significant publications during this year focussed on the demonstration of laboratory evolution of circadian systems under selection, and the effects of migration rate and other perturbations on metapopulation dynamics and stability. This work has yielded papers in top journals viz. *Science*, *Journal of Biological Rhythms*, *PLoS ONE* and *BMC Developmental Biology*. Some salient results from this work are summarized below.

Theoretical studies have suggested that constant mortality in the pre-reproductive phase should have a major stabilizing effect on population dynamics. Experimentally, however, *Drosophila* populations maintained on a destabilizing food regime were shown to exhibit stabilization of the dynamics, relative to controls, at 20% and 40% imposed adult mortality, but not at 10% mortality. It has been hypothesized that this somewhat counter-intuitive result is due to an interaction of the pattern of extinction in these small populations with mortality rate, and further theoretical investigations are underway.

Computer simulation studies based on the Ricker or other such simple models as the recursive equation governing sub-population dynamics suggest that pinning (constant addition of individuals to a sub-set of subpopulations) can stabilize the dynamics of metapopulations in which subpopulations exhibit unstable dynamics. This prediction was tested experimentally and it was found that *Drosophila* metapopulations could not be stabilized by pinning. It was then shown theoretically that these results are likely to be quite generalizable and that, in fact, real metapopulations with a small number of subpopulations, noise and extinction are very unlikely to be stabilized by pinning, unless a large proportion of subpopulations are pinned. This work strongly suggests that pinning is unlikely to be a useful strategy for stabilizing fragmented populations in the wild, contrary to some earlier suggestions in the literature.

Extensive computer simulation studies on the effects of migration on metapopulation dynamics and stability revealed that intermediate levels of migration (5-10% per generation) promote stability of metapopulations via asynchrony among subpopulations, whereas higher migration rates promote synchrony and hence unstable metapopulation dynamics. This pattern of results was shown to be robust to a variety of assumptions about the nature of migration (density-dependent, density-independent or stochastic), as well as different spatial arrangements of demographically heterogeneous or even empty patches, results that are reassuring because they suggest that much realistic spatial detail can be safely ignored while modelling metapopulation dynamics. An interesting result is that if migration does not occur every generation, the stabilizing effects of intermediate levels of migration are lost. Experiments with *Drosophila* metapopulations verified that 10% migration promoted stability via asynchrony, whereas 30% migration led to synchrony and hence instability at the metapopulation level.

Selection for early and late eclosing *Drosophila* has led to the establishment of considerably diverged populations, with very different phase of peak eclosion. Further studies on the time course and waveform of the circadian eclosion and locomotor activity rhythms in these flies have shown clearly that the circadian clocks in these populations have undergone considerable evolutionary change as a response to the selection. This is the first rigorous study of its kind. These populations are now being used for ongoing studies into the molecular correlates of the evolved changes in clock attributes.

Path-breaking studies of egg-laying rhythm in *Drosophila* mutants lacking the expression of various genes in targeted neurons and other tissues has clearly revealed that the circadian egg-laying rhythm is independent of the primary 'master clock' in the lateral ventral neurons of the *Drosophila* brain.

There is also preliminary evidence that the putative 'egg-laying clock' may involve new genes, different from those known to be involved in the 'master clock'. Ongoing research is aimed at trying to identify the genes involved in the 'egg-laying clock'.

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5. Geodynamics Unit

1. Activities:

A) The project on neotectonics and implications for occurrence of natural hazards and water conservation in Central Kerala was completed. A joint paper embodying the observations and deductions is in the press.

B) Field work in the upper reaches of the Western Dhaulī River in northeastern Garhwal (Niti Pass Area) was done in the early part of May 2006.

In June 2007 detailed work will be carried out in the Jadhganga Valley, tributary of the Bhagirathi (Ganga) (close to India–Tibet border) to gather data on the tectonics, continuing activity, and geomorphic development related to the Trans - Himadri Detachment Fault.

C) Project on writing of the book “The Making of India: Geodynamic Evolution” is nearing completion. Twenty-six chapters of the book covering 953 pages with 382 illustrations have been written. Each chapter was critically reviewed by 2 to 4 reviewers. The reviewers' suggestions/modifications are being incorporated in the revised manuscript. The manuscript of the book would be ready for submission to the publisher Macmillan India Ltd, New Delhi, by the end of May 2007.

2. New Programmes:

1) Study in collaboration with Prof. Kanchan Pande, IIT, Mumbai on “The Basic Intrusives in the Deoban Succession in eastern Kumaun, Uttarakhand Himalaya.”

2) Popular book writing:

Hindi book “*Bhukamp Aur Bhu-skhalan ke Sankaton ka Saamna Kaise Karen*”

Chair

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6. Molecular Biology and Genetics Unit

Over the period 2006-2007, key developments in the Molecular Biology and Genetics Unit involved the addition of two major equipment to the Unit's instrumentation facility, receipt of two major grants (on stem cells and drug screening) and award of Ph.D degree to two students. Four students have submitted their theses during this period. A stem cell workshop and a meeting on chromatin remodeling and transcription regulation were held during this period. During the summer of 2006, the Unit hosted 11 students under the summer research fellowship programme (SRFP) of JNCASR. The Unit along with EOBU also started the programme on Project oriented education in Biology (POBE) with the selection of ten students from a nation-wide screen. A brief summary of research work along with results obtained from each of the seven laboratories in the unit is summarized below.

Chromatin Biology Laboratory

The focus of work on chromatin remodeling during mammalian spermiogenesis has led to the finding that import of TP2 into haploid spermatid nucleus requires cytosolic components. Using a combination of approaches the laboratory has identified importin 4 as the transporter. Further, through the use of in silico and experimental approaches the group has identified the site on importin 4 that binds TP2. A second aspect of study, in this laboratory, relates to the identification of function of a non - coding RNA within a meiotic recombination hot spot locus of mouse. Their studies on the non-coding RNA of 2.4 kb show that it undergoes processing to a 80 nucleotide fragment with a distinct secondary structure, is a substrate for Dicer and is localized solely to the nucleus. The studies highlight the importance of the 2.4 kb RNA and its processed fragment in RNA based regulatory processes.

Molecular Parasitology Laboratory

Molecular Parasitology Laboratory has been working on type II fatty acid synthesis pathway in *P.falciparum*. The proteins of this pathway are nuclear encoded and transported to the organelle apicoplast. Their studies using the immunosuppressant deoxyspergualin have shown that interfering with trafficking is deleterious for parasite growth. **Their paper on this aspect has been cited by 'faculty of 1000'**. The group has also demonstrated that the activation of b-ketoacyl acyl carrier protein by NADPH is through increasing the binding affinity of the substrate and acyl carrier protein. This group has also demonstrated that inhibitors of fatty acid biosynthesis display rapid parasitocidal effects unlike antibiotics that bring about delayed death of the parasite.

Protein Engineering Laboratory

Protein Engineering Laboratory has been involved in studying enzymes involved in purine nucleotide metabolism from human, *Plasmodium falciparum* and *Methanococcus jannaschii*. Attempts at understanding the function of *P. falciparum* GMP synthetase have led to the elucidation of the kinetic events that result in substrate channeling in this enzyme. Their studies on *P. falciparum* adenylosuccinate lyase show that the enzyme, apart from hydrolyzing succinyl-AMP, has retained its ability to carry out the conversion of SAICAR to AICAR, a reaction of de novo pathway. In an attempt to elucidate the structural basis of substrate specificity in HGPRTs, chimeric enzymes consisting of segments from the parasite and human proteins were constructed. The crystal structure of one of the chimeras, solved in collaboration with Prof. MRN. Murthy, Indian Institute of Science, shows altered subunit association with 180° flip of the subunits at the dimer interface. This laboratory is also probing the alterations in the structure of the purine bases and their nucleotides on liganding with HGPRT using resonance Raman spectroscopy in collaboration with Dr. Mrinalini Puranik, National Centre for Biological Sciences.

Human Molecular Genetics Laboratory

The genetic basis of hearing loss in humans is under investigation in Human Molecular Genetics Laboratory. In the past year, this laboratory has continued to expand the search for deafness-associated genes in the Indian populations. Over 500 families in the Indian population, after exclusion of mutations in the Connexin 26 gene, are being screened for mutations in the known deafness genes *TMCI*, *TMPRSS3* and *HAR*. The biological basis for the pathological consequences of the mutations identified are beginning to be explored. These include inner ear expression studies by *in situ* hybridization and when antibodies are available, by immunofluorescence. This is the first study of its kind to be performed at JNCASR in India, and not by foreign institutions whose scientists have obtained DNA from India.



In the future, such studies shall create a foundation that can be used to pave the way for improved intervention, possibilities of gene therapy and hair cell regeneration to alleviate congenital and age-related hearing loss for the populations being dealt with.

Molecular Virology Laboratory

The HIV laboratory has developed a strategy for HIV-1 Tat purification. Using the purified Tat, Prof. Ranga Uday Kumar and coworkers have demonstrated that the transactivation and signaling properties of Tat are not correlated. The paper reporting these results is one of the most downloaded research publications of the journal.

Vascular Biology Laboratory

Vascular Biology Laboratory aims to decipher the mechanisms underlying cardiovascular development. Earlier studies from this laboratory, using ES cells, have led to identification of two novel genes, *asrij* and *rudhira*, that have conserved gene expression and function in the circulatory system. The genes have been identified and characterized for their developmental expression, subcellular localization, mutant phenotype and regulation. As these genes are conserved, analysis of their counterparts in *Drosophila*, have shown that both *asrij* and *rudhira* are associated with the circulatory system. These genes have also been shown to be novel markers for ES cells and the developing mammalian cardiovascular system, and have been shown to be upregulated in tumors. Recently Dr. Inamdar has set up a Human Stem Cell Laboratory at JNCASR funded by the Department of Biotechnology (DBT), Govt. of India. Both *asrij* and *rudhira* are found to be expressed in the embryonic stem cell (hES) and embryonic carcinoma (hEC) cell lines established here. The group is now gearing up to derive human ES cell lines. The reagents generated will be valuable for understanding ES cell pluripotency, cardiovascular development, cell fate specification and regulation of function.

Transcription and Disease Laboratory

and Disease Laboratory has extended their area of research into the field of nanotechnology. By employing silver/silver-gold nanoparticle and Raman spectroscopy they have reported the surface enhanced Raman scattering from the histone acetyltransferase, p300 and its mode of interactions with various small molecules. This technique is being exploited to study drug protein interactions.

Molecular Mycology Laboratory

Molecular Mycology Laboratory, started in 2005, has initiated studies on structure-function aspects of centromeres of the pathogenic yeasts *Candida albicans* and *Candida dubliniensis*. The main objectives of the investigations are: 1. Identification of centromeres of *C. dubliniensis* and comparative analysis of centromere structure and function of *C. albicans* and *C. dubliniensis*, 2. Functional characterization of an evolutionarily conserved kinetochore protein CaMtw1, a homolog of human Mis12p and identification of its interacting proteins, 3. Characterization of components of a fungal-specific kinetochore complex called DASH complex as possible drug targets and 4. Characterization of histone H3 variants-CENP-A, histone H3.1 and histone H3.3 and their role in specialized centromeric nucleosome formation in *C. albicans*.

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7. Theoretical Sciences Unit

A brief summary of research activities in different subgroups is given below. The research studies have led to several publications in leading journals in physics and chemistry. Several courses have been taught by faculty members of the TSU during this period.

Using density functional theory, it was found that small clusters are softer than bulk materials, though the degree of softening is inversely proportional to the coordination of the bulk material. New scaling relations were discovered, relating the radial force constant, bond length and coordination number for clusters. The lifting of the reconstruction of Ir(100) by CO was studied. It was found that a very low coverage of CO can lift the reconstruction. The results were extended to finite pressure and temperature and it was found that under industrial conditions, the unreconstructed surface lies close to the stability boundary. Universal relations were found relating the second derivative of binding energy curves to equilibrium bond lengths. Trends were found relating adsorption energies and dissociation barriers to coordination, strain, magnetism and charge transfer in the catalytic dissociation of NO on Rh surfaces and clusters. Step energies for Au(111) vicinal surfaces were determined.

A summer school on density functional theory was organized; one outcome of this summer school is a joint paper by the participating students and lecturers, on the possibility of stabilizing extended solid carbonia by doping with silicon.

A detailed numerical simulation (the highest resolution to-date) has been used to elucidate the manifestations of drag reduction by polymer additives in decaying, homogeneous, isotropic turbulence. Extensive numerical simulations have been used to show that spiral-wave dynamics depend sensitively on inhomogeneities in mathematical models of ventricular tissue; this has important implications for the treatment of cardiac arrhythmias such as ventricular fibrillation. An intuitively appealing mean-field theory has been developed for interacting Spin-1 bosons on a lattice; this has led to a rich, finite-temperature phase diagram that includes first-order transitions between superfluid and Mott-insulator phases that come together at a variety of tricritical points. This has immediate implications of studies of cold atoms in optical traps.

New models have been developed by identifying and optimizing parameters responsible for optical polarizations and charge mobilities in a large class of organic molecular crystals and supra-molecular systems. In-depth analysis of the role of quantum fluctuations in controlling the geometrical frustration in Kagome lattices has shed new insights into the magnetic behaviour in this emerging class of materials. The modelling of molecular electronics materials both by developing and applying new theoretical techniques for the study of molecular memory and switching devices have been pioneered. One of the recent works encompasses a study of biomolecular materials like DNA, their applications in magnetic switching devices and photon up- and down-conversion within protein geometry. These results have been published in leading journals in physics and chemistry. Work is also in process to optimize systems for applications in Hydrogen storage, PEF mechanisms and Hydrogen productions.

Work has been carried out on a variety of problems in statistical mechanics including maximum-valency lattice gas models, the tuning of tetrahedrality in a Silicon potential to obtain a series of monatomic (metal-like) glass formers of very high fragility, the glass transition and liquid-gas spinodal boundaries of metastable liquids, the protein-glass transition and the liquid-liquid critical point of water, and investigation of the relation between local diffusivity and local inherent structures in the Kob-Andersen Lennard-Jones model. Research has been carried out in gel-forming fluids, the interplay of phase separation and vitrification, the role of maximum valency and patchy interactions in liquid-gas phase behavior, protein aggregation, crystal nucleation in water, glass forming ability, protein dynamics.

The following schemes and symposia have been organised.

- NCBS-JNCASR-Harvard Symposium August 2006
- School on Understanding Molecular Simulations January 2007
- Conference on Nucleation Aggregation and Growth, January 2007

In the field of physics of strongly correlated systems (SCES), the progress made in two broad areas is described under (a) and (b) below. The progress made on optoelectronic devices is described under (c):

a) Thermodynamics of SCES : The Unit developed a formalism for computing the specific heat of the periodic Anderson model (PAM)(appropriate for heavy fermion (HF) systems) within dynamical mean field theory (DMFT). Further, iterated perturbation theory has been used to solve the PAM within DMFT and demonstrated that the specific heat of variety of HF materials may be explained within the PAM. The formalism and the associated code for understanding transition metal oxides, particularly those in the proximity of a Mott transition, have now been modified.

b) Magnetic field effects on transport and dynamics of heavy fermion systems: Most HF systems have an exponentially small low energy scale governing their transport and thermodynamics behaviour. This implies that small perturbations like magnetic field (B) can have a drastic effect on their properties. Hence, the effect of B on HF systems using the PAM within DMFT has been investigated. Local moment approach was used as the impurity solver. We reaffirmed the existence of a crossover from insulator to metal in the case of Kondo insulators (KIs), and also quantitatively explained the gap behaviour seen experimentally in YbB₁₂, a classic KI. In the case of HF metals, we demonstrated huge magnetoresistance and found good quantitative agreement with data on CeB₆.

c) The work on optoelectronic devices is a collaborative effort with CPMU. The Unit has successfully modeled a class of organic Schottky contact based devices fabricated in their group. In the discrete circuit element model, a novel approach named the spreading impedance approach has been developed and showed that such an approach, though phenomenological, is very powerful in the case of highly disordered polymeric systems. In a separate work carried out in part by a summer student, the full parameter space and the non-linear regimes of such a device using the aforementioned model has been explored. The transient response and the dependence of lateral photovoltage on modulation frequencies is presently under study.

In collaboration with an experimental group of CPMU, the Unit has discovered and analyzed a new family of biferroic materials - rare earth chromites. The Unit has demonstrated through molecular dynamics simulations that nano-polar ordering in relaxor (glassy) ferroelectrics correlates with chemical ordering. In collaboration with theoretical and experimental groups from Harvard, the Unit used home-grown tools based on Wannier functions to understand how chemically active gold becomes at nano-scale.

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8. Chemical Biology Unit

Calculations predict that cation- π interactions make an important contribution to protein stability. While there have been some attempts to experimentally measure strengths of cation- π interactions using peptide model systems, much less experimental data is available for globular proteins. We have attempted to determine the magnitude of cation- π interactions of Lys with aromatic amino acids in four different proteins (LIVBP, MBP, RBP and Trx). In each case, Lys was replaced with Gln and Met. In a separate series of experiments, the aromatic amino acid in each cation- π pair was replaced by Leu. Stabilities of wild type (WT) and mutant proteins were characterized by both thermal and chemical denaturation. Gln and Aromatic amino acids to Leu mutants were consistently less stable than corresponding Met mutants reflecting the non-isosteric nature of these substitutions. The strength of the cation- π interaction was assessed by the value of the change in the free energy of unfolding ($DDG^0 = DG^0(\text{Met}) - DG^0(\text{WT})$). This ranged from +1.1 to -1.9 kcal/mol (average value -0.4 kcal/mol) at 298 K and +0.7 to -2.6 kcal/mol (average value -1.1 kcal/mol) at the T_m of each WT. It therefore appears that the strength of cation- π interactions increases with temperature. In addition, the experimentally measured values are appreciably smaller in magnitude than calculated values with an average difference $|DG^0_{\text{expt}} - DG^0_{\text{calc,avg}}|$ of 2.9 kcal/mol. At room temperature, the data indicate that cation- π interactions are at best weakly stabilizing and in some cases are clearly destabilizing. However at elevated temperatures, close to typical T_m 's, cation- π interactions are generally stabilizing.

The total syntheses of over a dozen molecules having a variety of biological activity, and of varying degree of complexity have been accomplished. Some of these natural products are of great contemporary interest and the activities in this area will be strengthened in the coming months.

A novel strategy has been developed for the design of nanoparticle-gel hybrid materials. The use of bile acid backbone on both the gelator and the nanoparticle stabilizers allowed gold nanoparticles to be stabilized and dispersed in a medium in which it is not dispersible. Such materials may be further developed for the design of sensors. A series of bile acid derived light-harvesting systems have been designed and evaluated by a combination of steady-state and time-resolved fluorescence spectroscopy. Efficient energy transfer has been achieved in such systems.

DNA binding by three isomeric bis 2-(*n*-pyridyl)-1*H*-benzimidazoles ($n = 2, 3, 4$) were investigated in the absence and presence of divalent metal ions Mg^{2+} , Co^{2+} , Ni^{2+} , Cu^{2+} and Zn^{2+} . Ligand-DNA interactions were probed using fluorescence spectroscopy and circular dichroism. These studies revealed that the binding of 2-pyridyl derivative to DNA was dramatically reduced in the presence of Co^{2+} , Ni^{2+} , Cu^{2+} ions and abolished completely at 1:1 ligand: cation ratio. The synthesis and DNA binding properties of novel biscationic dimers of bisbenzimidazole systems were accomplished and the influence of linker on the affinity and mode of DNA binding was examined.

Five pseudoglycerol gemini lipids possessing varying lengths of oxyethylene $[(-CH_2-O-CH_2-)_n]$ spacers between cationic ammonium head groups have been synthesized, where n varies from 1 to 5. The membrane forming properties of these gemini cationic lipids were investigated. All the gemini lipids formed stable suspensions in water. The presence of membranous aggregates in such lipid suspensions was evidenced by transmission electron microscopy.

The following are the members of the Unit:

Chair Uday Maitra	Ph D, FA Sc.
Professor V Krishnan (Hindustan Lever Research Professor)	Ph D, F A Sc, F N A, FTW A S
Hon Professors P Balaram G Mehta	Ph D, F A Sc, F N A, FTW A S Ph D, F A Sc, F N A, FTW A S
Hon Faculty Raghavan Varadarajan Santanu Bhattacharya	Ph D, F A Sc, F N A Ph D, F A Sc
Research Associate Dhanabal T, Prithwiraj De, Ramakrishna Basak, Uday Kumar Kundu	

9. Condensed Matter Theory Unit

The members of the Condensed Matter Theory Unit (CMTU) are engaged in theoretical research on a wide variety of topics in the general area of Condensed Matter Science. During the period from 2006-07, they achieved significant progress on several problems in this area in which support from JNCASR has been acknowledged, and these are summarized below. More details can be gleaned from the publications listed below.

Electronic structure and properties, especially in Strongly Correlated Electronic Systems :

The theory for doped manganites exhibiting colossal magnetoresistance developed recently was extended in two major ways: (1) The effects of coulomb interactions and doping disorder were included, and shown to account for nanoscopic inhomogeneities. (2) Corehole effects were included and shown to account for a major recent puzzle in the core-hole photoemission in these materials, namely the observation of temperature and doping dependent shoulders.

It was shown using dynamical mean-field theory that there can be a regime of parameters where correlations can drive a band insulator metallic.

A simple approach to estimate the size distribution of any semiconducting nanocrystal system based on the spread of the readily available UV absorption spectrum was developed. This method is intrinsically very fast and extremely sensitive, and is ideally suited for the study of growth mechanisms of nanocrystals in solution.

Several interesting new systems, in particular Cu doped ZnO with blue emission, were synthesized; this is possibly the first report of visible emission from a transition metal doped ZnO nanoparticle. In the context of blue emission, a new polymeric system, based on PANI, that emits in the blue was also synthesized.

Several significant contributions were made to the understanding of the origin of magnetism in interesting systems such as the pyrochlore $Ti_2Mn_2O_7$.

It was established that the large magnetoresistance in Sr_2FeMoO_6 arises from a new mechanism where the magnetism of the insulating grain boundary material is the controlling parameter. This new mechanism has been termed SVMR in view of its similarity to a spin-valve like mechanism being responsible for the observed details of MR.

Soft Condensed Matter and Nonequilibrium Statistical Physics :

Developed theories and carried out simulations which established that the nematic liquid-crystalline state in self-driven systems is intrinsically phase-separated.

Showed that, contrary to conventional wisdom, current-density fluctuations cannot cut off the mode-coupling glass transition.

Carried out experiments which have established the existence of a nematic phase, as well as regimes with strong four-fold and stripe-like correlations, in vibrated monolayers of macroscopic rods. Also presented evidence for spontaneously rotating and swirling states in this system.

Dynamical processes involving long chain molecules were studied theoretically, with particular emphasis on the problems of loop formation of a semiflexible polymer and the transport of proteins across nuclear pores. Recently, transfer of electronic excitation energy from a dye molecule to a nanoparticle was analysed.



Studies into diffusion of solutes in solutions by molecular dynamics technique were carried out for a range of solutes sizes. The studies show that the Stokes-Einstein relationship between diffusivity and solute radius breaks down for intermediate sizes of the solute. Further, the studies show that this deviation has its origin in the van der Waals interaction between the solute and the solvent. The diffusivity is enhanced over and above that of Stokes-Einstein value.

Chair

H R Krishnamurthy

Ph D, F A Sc, F N A

Hon. Professors

Biman Bagchi

Ph D, F A Sc, F N A, F T W A S

Chandan Dasgupta

Ph D, F A Sc, F N A

N Kumar

Ph D, F A Sc, F N A, F T W A S

S Ramasesha

Ph D, F A Sc.

D D Sarma

Ph D, F A Sc, F N A

Hon Faculty

G Ananthakrishna

Ph D, F A Sc

Binny J Cherayil

Ph D

Diptiman Sen

Ph D, F A Sc

Rahul Pandit

Ph D, F A Sc, F N A

K L Sebastian

Ph D, F A Sc

Sriram Ramaswamy

Ph D, F A Sc

S Yashonath

Ph D, F A Sc

Research Associate

Arul Murugan N, Madhavan Unni P K (P),

R & D Assistants

Nandan Pakhira, Subra Sen Gupta

10. Computer Laboratory

Activities in the Computer Lab involve (a) regular day-to-day maintenance and repair of computers and local network across the Centre (b) keeping the presence of the centre on the web up-to-date (c) help users of the central computing facility with computing, printing and other peripheral facilities and (d) maintain backups and network security measures.

In addition, new features are introduced at this laboratory to keep up with evolving changes in computing technology. The following are the highlights during this year:

- Upgradation of the LAN to 1 Gbps has been formulated and placed an order for. This will include a manageable chassis CISCO switch in the central facility which will provide an expandable connectivity through OFC to new active switches to be placed in different buildings.
- hardware of the www (webserver) upgraded.
- mercury, mail-server upgraded; message filter for webmail implemented.
- Purchased a new heavy-duty b/w printer for use in Complab.
- Computer Lab extension near AMRL conference hall with various windows clients (gabbro, jade, scoria, opal, albite) installed.
- Centralized mcafee antivirus server installed and clients were installed on the local network of JNC.
- Mathematica software installed in mars.
- Secondary DNS upgraded.
- Upgradation of various servers in the computer lab (lpc3 (printer), jakkur, mars, sankey, yediyur) completed.
- Firewall, FortiGate 300A installed; FortiAnalyzer installed
- Efforts are being made for achieving a 4 MBps link at the Centre.
- Acquired two linux servers to help Virgosys company in creating a new web server and provided technical consultation for migration to the new server.
- Maintenance of printers, various switched on the local area network, provision of additional network connections to new faculty groups, repair of computers across the Centre were the routine activities Complab provided in this period.

The following are the members of the Laboratory:

Head

Umesh V Waghmare

Ph D

R & D Assistants

Ravi Kumar, Shithal T K, Vikas Mohan Bajpai (Jr.R&D)



Endowed Research Professors

D S Kothari Chair

M M Sharma,

FRS, F A Sc, F N A

Hindustan Lever Chair

V Krishnan,

F A Sc, F N A, F T W A S

Linus Pauling Research Professor

C N R Rao,

F A Sc, F N A, F R S, F T W A S,
Hon. F R S C

Vikram Sarabhai Research Professor

B M Deb,

F A Sc, F N A, F T W A S

ACADEMIC PROGRAMMES

1. Academic Activities

The Centre offers regular Ph D., Integrated Ph D, M S and M S (Engg.) degree programmes in Science and Engineering. The Integrated Ph D programme (Chemical Sciences) is available to those with a B Sc degree. The regular Ph D programme is available to graduates and post-graduates in science and engineering, who have successfully completed GATE/UGC-CSIR-NET, JRF, ICMR JRF/JEST/equivalent examinations. The Centre selects candidates on an all-India basis, offers course work, provides research facilities, administers the programme and awards the degree.

(a) Research Admissions

During the year 2006-2007, 29 students (one for Integrated Ph D, 18 students for Ph D, 8 students for M S(Engg.)) and 2 students for M S degrees were admitted in the following Units:

Sl. No	Units	Programme	Name of students
1	Chemistry & Physics of Materials	Int. Ph D Ph D M S (Engg.)	H S S Ramakrishna Matte Monojit Bag, Pranab Mandal, Srinivasa Raju G, Surampalli Kishore Subrahmanyam K S, Kalyan Raidongia, Sabyasachi Mukhopadhyay
2	Evolutionary & Organismal Biology	Ph D M S	Mukesh Kumar Lalwani, Pankaj Yadav, Snigdhadip Dey M Muzafar Beigh, Manjunath T
3	Molecular Biology & Genetics	Ph D	Abhishek Sinha, Deepak Kumar Jha, Himani Joshi, Jitendra Devi, Laxmi Narayan Mishra, Libin Abraham, Mahesh B, Mukti Nath Mishra, Surendra Kumar Shukla
4	Theoretical Sciences	Ph D	Shiladitya Sengupta, Marathe Madhura Pradeep
5	Engineering Mechanics	M S (Engg.)	Anubhab Roy, Bishakhdatta Gayen, Deveranjan Samanta, Gayathri S, Vivekanand Dabade

(b) Degrees awarded

Details of degrees awarded during the year are as given below:

Sl. No	Units	Degree	Name of students
1	Chemistry and Physics of Materials	Ph D M S (Int.Ph D)	Sandip Chakrabarti, Leonard F Deepak, Asish K Kundu, Bhuvana T
2	Evolutionary and Organismal Biology	Ph D	Dhanashree Paranjpe
3	Molecular Biology & Genetics	Ph D	Venkatesh Swaminathan, Arpita Mukhopadhyay
4	Engineering Mechanics	Ph D M S (Engg.)	Vinod N, Subarna Bhattacharyya Manikandan M S, Shreyas J V
5	Theoretical Sciences	Ph D	Raghani Pushpa N, Ashwin S Sampangiraj



2. Discussion Meetings/Workshops

The following discussion meetings/workshops were supported by the Centre since the last report:

International symposium on "Non-oxide and new optical glasses", April 10-14, 2006, Prof K S Sangunni (IISc)

Indo-Israel Conference – 2006, May 4-8, 2006, Prof C N R Rao and Dr Umesh V Waghmare (JNCASR) and Prof D D Sarma (IISc)

Eleventh Asian Congress of Fluid Mechanics at Kuala Lumpur, Malaysia, May 22-25, 2006 Dr P R Viswanath (NAL)

Geometric methods in topology, June 8 – 29, 2006, Dr Harish Seshadri (IISc)

Summer School on Computational Materials Theory, July 10-22, 2006, Prof Shobhana Narasimhan and Dr Umesh V Waghmare (JNCASR)

International Workshop on Strongly Correlated Systems, July 16-20, 2006, Prof D D Sarma and Prof Senthil Todari (IISc)

9th Annual CFD Symposium, August 11-12, 2006, Dr Sekhar Majumdar (NAL)

Harvard – JNC – NCBS Symposium, August 1-13, 2006, Prof Srikanth Sastry (JNCASR)

Consortium of Students in Management Research (COSMAR) – 2006 – An International Seminar, September 21-23, 2006, Prof K R Yogendra Simha (IISc)

National Conference in Chemistry – 2006, September 27-29, 2006, Dr V V Suresh Babu and Prof V Vishnu Kamath, Bangalore University.

Workshop on "Issues of Higher Mathematics", October 24-25, 2006, Dr BV Sreeekantan (NIAS).

"Genes, Development and Disease", October 27-28, 2006, Prof H Sharat Chandra, Centre for Human Genetics (IISc)

JNC Conference on Chemistry of Materials, October 29-31, 2006 at Kollam, Kerala.

National Conference on "Challenges and Vision 2026 in Science Communication", November 26, 2006, Prof JV Narlikar and Mr A P Deshpande (NCSC)

Workshop in Chemistry for Postgraduate Students, November 27-29, 2006 at Trivandrum, Prof S Chandrasekaran (IISc)

Workshop on "Level Set Methods and its Application", December 4-15, 2006, Prof Phoolan Prasad (IISc) and Mr Vanninathan and G D Veerappa Gowda (TIFR)

Course for University & College Teachers on "Current Frontiers of Research in Natural Sciences, Social Sciences and Humanities", December 6 – 26, 2006, Dr K Kasturirengan, National Institute of Advanced Studies.

Symposium: Chromosome; Functional Thread of Life, December 11 - 13, 2006 Prof Tapas Kumar Kundu (JNCASR)

National Symposium on "Theoretical Chemistry" (TCS 2006), December 11-13, 2006, Dr P Venuvanalingam (Bharathidasan University, Thiruchirappalli)

International Winter School on Chemistry of Materials, December 14 – 20, 2006, Prof A K Cheetam, and Prof C N R Rao, Prof S K Pati and Dr A Sundaresan (JNCASR)

Tenth Transcription Assembly, December 14-16, 2006, Prof Siddhartha Roy (IICCB Kolkata)

Workshop on Cancer: Epidemics, Cause and Remedy for High School Students, December 18-20, 2006, Dr Ramendu Ghosh, Prayash Atreyee, West Bengal.

High School Science Teachers Programme at Gadag, December 22-31, 2006, Prof Arun M Umarji and Prof S Ramkumar (IISc)

32nd Mahabaleshwar Seminar on "Parasite Immunology and Immunogenetics", January 7-11, 2007, Prof Shobhona Sharma (TIFR, Mumbai)

Conference on "Recent Trends in Many Body Methods for Electronic Structure and Properties of Atoms and Molecules", January 11-13, 2007, Prof Debashis Mukherjee, IACS, Kolkata.

Molecular & Cellular Biology and Therapeutics of HIV and Associated Viral Infections, January 12-14, 2007, Dr Anand K Kondapi, Dept. of Biochemistry, University of Hyderabad.

International School on "Understanding Molecular Simulation" January 22-27, and International Conference on "Nucleation, Aggregation and Growth", January 29-31, 2007, Prof Srikanth Sastry (JNCASR)

Asian Spectroscopy and Asian Biospectroscopy Conference, January 29 to February 3, 2007, Prof S Umapathy and Prof E Arunan, Dept. of IPC, IISc.

Symposium on Nanomaterials and Soft Matters, February 8-9, 2007, Prof C N R Rao and Dr A Sundaresan (JNCASR)

Symposium on Trends in Computational Materials Science, February 15-17, 2007, Prof S Balasubramanian and Prof Shobhana Narasimhan (JNCASR)

Annual Meeting of the Molecular Immunology Forum-2007, March 1-3, 2007, Prof R Manjunath and Prof Anjali Anoop Karande, Dept of Biochemistry (IISc).

3. Colloquia

The following colloquia on Fluid Dynamics were held under the series:

Entrainment in Round Jets, Prof. Joseph Mathew, Dept. of Aerospace Engineering, IISc, Bangalore, April 12, 2006

Scattering of surface water waves - integral equations approach, Prof. A. Chakrabarti, Department of mathematics, Indian Institute of Science, Bangalore 560012, April 26, 2006.

Critical phenomena aspects of fully developed turbulence, Dr. Bhimsen Shivamoggi, Department of Mathematics, University of Central Florida, USA, June 28, 2006.

Gravitational settling of symmetric bodies in second-order fluids, Dr. Ashwin Vaidya, Department of Mathematics, University of North Carolina, USA, July 25, 2006.

The use of asymptotic computational dynamics (ACFD) in multi-mode heat transfer problems, Dr. C. Balaji, Associate professor, Department of Mechanical Engineering, IIT Madras, September 20, 2006.

Turbulence and scalar exchange at the air-water interface, Prof. Sanjoy Banerjee, Department of mechanical and environmental engineering, University of California at Santa Barbara, December 14, 2006.

A grid-free numerical method for turbomachinery aeroelasticity, Dr. V. Ramesh, National Aerospace Laboratories, Bangalore, January 3, 2007.

Gyrotactic bioconvection simulations, Dr.S.Ghorai, Department of Mathematics and Statistics, IIT Kanpur, February 14, 2006.

The excitement of watching paints dry, Dr. Mahesh S. Tirumkudulu, Assistant professor, Department of chemical engineering, IIT Bombay, Mumbai, February 21, 2007.

RANS calculations using the meshless solver LSFD-U, Dr. N Balakrishnan, Department of Aerospace Engineering, IISc, February 28, 2007.



Synchronization and cooperative oscillations - the dynamics of eukaryotic cilia and flagella, Dr. Arvind Gopinath, Post-doctoral scholar, Applied Mathematics Lab, Harvard University, March 6, 2007.

The collective dynamics of self-propelled particles, Dr. Prabhu R. Nott, Dept. of Chemical Engineering, IISc. Bangalore, March 28, 2007.

4. Special Lectures

Michael Faraday Lecture (Seventh in the series): *All that glitters is not gold*, Prof. Richard N. Zare, Dept. of Chemistry, Stanford University, USA, November 24, 2006.

Rajiv Gandhi Science & Technology Lecture (12th in the series): *21st Century Science : Cosmic Perspectives and Terrestrial Challenges*, Prof. Martin Rees, President , Royal Society, London, January 12, 2007

5. Endowment Lectures

DAE-Raja Ramanna Endowment Lectures In Physics:

Noise as a probe of the condensed matter: adding new dimensions, Prof A K Raychaudhuri, Director, S N Bose National Centre for Basic Sciences, Kolkata, August 10, 2006.

Prize Lecture:

Bugs, molecular motors, brownian inchworms and copper rods, Prof Sriram Ramaswamy, Dept. of Physics, Indian Institute of Science, Bangalore, August 10, 2006.

C N R Rao Oration Award Lecture :

How many atoms maketh a metal, Prof G U Kulkarni, JNCASR, August 4, 2006.

Prof. V. Ramalingaswami Memorial Lecture:

Quality and Challenges for Stem Cell Therapy in Indian and International Scenario, Prof N K Ganguly, Director General, ICMR, New Delhi, August 8, 2006.

ISRO-Satish Dhawan Lecture:

Adivasis, Naxalites, and Indian Democracy, Dr. Ramachandra Guha, Renowned Historian, January 22, 2007

6. Frontier Lecture

Science, Art and Drug Discovery: A Personal Perspective, Dr Simon Campbell, FRS, President, Royal Society of Chemistry, UK, May 29, 2006.

7. General Lecture

IPR Laws, Ever-greening and incremental innovations, Mr Ravi Bhola, Intellectual Property Attorney, M/s K & S Partners, Bangalore, March 15, 2007.

8. Lectures delivered at the Annual Faculty Meeting by Faculty/ Hon. Faculty

From coherence to decoherence – Prof S Dattagupta

(De)Constructing Matter – Dr Senthil Todadri

How metabolite diversity could be generated from limited number of Genes – Dr Rajesh Gokhale

Making materials at different length scales – Dr M Eswaramoorthy

Using hydrodynamic irreversibility to enhance transport process in Multi-phase systems - Dr Ganesh Subramanian

9. Seminars

The following seminars were held during 2006-2007:

Generalized peierls transition in organic solids, Prof. Zoltan Soos, Princeton University, April 6, 2006

Understanding conformational changes using molecular dynamics, Dr. Nilesh Banavali, Institute of Molecular Pediatric Sciences, Department of Pediatrics, University of Chicago, USA, April 27, 2006

New light on phosphors for solid state lighting, Prof. A. K. Cheetham, Materials Reserch Lab, UCSB, Santa Barbara, USA, May 1, 2006.

Toward strong interactions in circular quantum dots: Correlation induced inhomogeneity, Dr. Amit Ghosal, University of California, Los Angeles, May 8, 2006.

Simulations of random copolymer collapse in dilute solution, Dr Guruswamy kumaraswamy, National Chemical Laboratories, Pune, May 16, 2006.

Multiple Hsp60 genes in Drosophila melanogaster and their roles in development, Prof. S. C. Lakhota, Head, Dept. of Molecular and Human Genetics, Banares Hindu University, Varanasi, May 31, 2006.

Lecture on safety of radioactivity usage, Prof. P Kondiah, Indian Institute of Science, Bangalore, June 2, 2006.

T helper cells and the immune response, Dr Satish Devadas, Dept of Molecular Genetics, Microbiology and Immunology, UMDNJ, Piscataway, USA, June 14, 2006.

Nanoscience and its technolgical potential in health and sustainability, Prof. James K. Gimzewski, Dept. of chemistry, California nanotechnology sytem Institute, California, June 26, 2006.

Interactions of a representative G-protein coupled receptor with membrane lipids: Implications in health and disease, Dr Amit Chattopadhyay, Centre for Cellular and Molecular Biology, Hyderabad, July 13, 2006

Nanoscale electrical characterization of optoelectronic materials/devices, Dr. S. Anand, Dept. of Microelectronics and Applied Physics (MAP), S-16440 KISTA, Sweden, July 21, 2006.

Critical dynamics in fluids: Verifying Theory through simulations, Dr. Subir K. Das, University of Maryland, USA, August 4, 2006.

Hydrogen bonding and coordination in liquid and supercritical water from X-ray inelastic scattering, Prof. Abhay K. Shukla, Laboratoire de Minéralogie-Cristallographie, case 115, 4 Place Jussieu, 75252, Paris cedex 05, France, August 11, 2006.

Microtubule dynamics, mitosis and cancer chemotherapy, Prof. Dulal Panda, Associate Professor, IIT-Bombay, Mumbai, August 18, 2006

Aging dynamics and effective temperature in polymers and gels, Prof. Sergio Ciliberto Ecole Normale Supérieure de Lyon, France, August 24, 2006.

Wireless information transport through organic monolayer on Au (111): pre-requisites of bio-processor, Dr. Anirban Bandyopadhyay, International Center for Young Scientists, National Institute of Material Science, Tsukuba, Japan, August 24, 2006.

Active tectonics, earthquake recurrence, and seismic hazard estimation, Dr. C. P. Rajendran, Scientist, Centre for Earth Science Studies, Akkulam, Trivandrum, Kerala, September 6, 2006.

Early and late signaling events during T cell activation, Dr. Jayajit Das, Massachusetts Institute of Technology, Cambridge, September 22, 2006.

Genome Dynamics: in variety of time frames, Prof B J Rao, TIFR, Mumbai, September 22, 2006

Deterministic and stochastic regimes of asexual evolution on rugged fitness landscapes, Dr. Kavita Jain, Weizmann Institute, Israel, September 26, 2006.



Insights into function and regulation of Cohesin ATPase activity, Dr. Prakash Arumugam, Department of Biochemistry, University of Oxford, September 28, 2006.

Timescales and pathways of vibrational energy relaxation in liquid bromoform, Dr. Sai Ramesh, Department of Chemistry, University of Wisconsin, October 6, 2006.

Surface-phase and nanostructure formation in heteroepitaxial growth, Dr. S. M. Shivaprasad, Surface Physics and Nanostructures, National Physical Laboratory, New Delhi, October 11, 2006.

Sex and the single genome: Evolutionary cost and consequences of gender, Dr. N. G. Prasad, Dept. of Biology, Queen's University, Kingston, Canada, October 12, 2006 (Special Seminar)

Analysis of viscous-inviscid interaction, Prof. Ramesh Yapalparvi, University of Manchester, November 3, 2006.

Research on venoms and toxins: Fascinating future, Dr. Kini R Manjunatha, National University of Singapore, November 14, 2006

Second Bangalore Stem Cell Course and Workshop, INCASR and NCBS, Bangalore, November 20 – December 3, 2006.

Electronic charge transport through (Bio)Molecules, Prof. David Cahen, Dept. of Chemistry, The Rowland and Sylvia Schaefer Chair in Energy Research, Weizmann Institute of Science, Israel, November 23, 2006.

Novel cancer chemoprevention strategies, Dr. Ramesh Gupta, Professor and Agnes Brown Duggan Chair in Oncological Research, Pharm & Tox/Brown Cancer Center, Univ. of Louisville, USA, November 24, 2006

Transcription: Structure and mechanism, Dr. Jayanta Mukhopadhyay, Postdoctoral associate, Rutgers University, November 29, 2006.

Dual fluorescence as a probe of photo-induced intramolecular charge transfer at very low temperatures (-20K), Prof. Yehuda Haas, Department of Physical Chemistry and the Parkas Center for Light Induced Processes, The Hebrew University of Jerusalem, Jerusalem, Israel, December 4, 2006.

Magnetic Properties of LBMO Thin Films, Deposition of high-current-density thick YBa₂Cu₃O₇ films without microcracks on CeO₂-buffered sapphire substrates for fault-current limiters, Prof. T. Endo and Dr. H. Yamazaki, School of Engineering, Mie University, Tsu, Mie 514-8507, Japan and AIST Japan, December 5, 2006.

Low Temperature Physics and Physicists six Decades Ago: Some Reminiscences, Dr. B. S. Chandrasekhar, Walther Meissner Institute, December 7, 2006.

Spontaneous extension of DNA in a two-dimensional fluidic nanoslit: anomalous electrostatics of confined charged objects, Dr. Madhavi Krishnan, Biotechnological Center, TU Dresden, December 20, 2006.

Physics of negative refractive index materials, Dr. S. Anantha Ramakrishna, Physics Department, Indian Institute of Technology, Kanpur, December 21, 2006.

Neural basis of REM sleep regulation, Prof. Birendra Nath Mallick, Professor of Neurobiology, School of Life Sciences, Jawaharlal Nehru University, New Delhi, December 26, 2006

Compositionally challenged nanocrystalline alloys and heterostructures, Dr. Bellave S. Shivaram, University of Virginia, USA, January 5, 2007.

Nanoscale dielectrics: Physical and dielectric properties from first principles, Dr. R. Ramprasad, Department of Chemical, Materials & Biomolecular Engineering Institute of Materials Science, University of Connecticut Storrs, CT, USA, January 5, 2007.

"Colloidal Gold: from fundamental properties to bio-medical applications", Prof. M. Brust, University of Liverpool, January 8, 2007.

Spin modulated molecular electronics: Opportunities and challenges, Dr. Ranjit Pati, Department of Physics, Michigan Technological University, USA, January 8, 2007.

Entropic compression of interacting DNA loops, Dr. Sumithra Sankararaman, Washington University, St. Louis, USA, February 1, 2007.

Recent developments in low valent/low coordinate main group and Lanthanide Chemistry Prof. Alan H. Cowley, Department of Chemistry and Biochemistry, The University of Texas at Austin, USA, February 6, 2006.

Oxides with low thermal conductivity at high temperatures, Prof. David R. Clarke, Materials department, University of California, USA, February 7, 2007.

AIST-JNCASR Joint Symposium on *Nano & soft matters*, February 8-9, 2007, AIST- Japan and JNCASR.

Workshop on *Advanced X-Ray Diffraction Techniques*, JNCASR and Bruker AXS Analytical Instruments Pvt. Ltd., Chennai, February 14, 2007.

Protein phosphorylation by inositol pyrophosphates, Dr. Rashna Bhandari, Dept. of Neuroscience, Johns Hopkins School of Medicine, Baltimore, February 16, 2007.

Rare earth transition metal chalcogenide structures, Prof Peter K. Dorhout, Colorado State University, Colorado, USA, February 16, 2007.

Study of magnetic nanomaterials using advanced structural and magnetic techniques, Dr. S M Yusuf, Babha Atomic Research Centre, Mumbai, February 19, 2007.

Slow dynamics in macroscopic degenerate ordered state in Ising-like Heisenberg kagome antiferromagnet, Prof. Seiji Miyashita, Dept. of Physics, Tokyo University, Japan, February 19, 2007.

Reverse evolution of ribosomes: Initiation of protein synthesis with longator tRNAs in Escherichia coli. Prof. Umesh Vashney, Indian Institute of Science, Bangalore, February 21, 2007.

Life on the edge: surface science studies of reactions and islands at a Cu(110) surface, Dr Phil Davies, Chemistry, Cardiff University, UK, March 1, 2007.

Multifunctional molecular magnetic materials: a new step in molecular magnetism, Professor Michel Verdaguer, University of Paris, March 2, 2007.

Ultrasound as a probe of Plasticity, Prof Fernando Lund, Director, CIMAT, FCFM—U.de Chile, Santiago, Chile, March 15, 2007.

A novel pathway for glutathione degradation in Saccharomyces cerevisiae, Dr. Anand Bachhawat, Scientist E, IMTECH, Chandigarh, March 29, 2007.

10. Conferences

Indo-Israel Conference, Faculty from JNCASR, IISc, NCL, TIFR, Universities in Israel, May 5, 2006.

International Symposium: *Chromosome; Functional Thread of Life*, December 11 - 13, 2006

International Winter School on *Chemistry of Materials*, December 14 - 20, 2006, Prof A K Cheetam, and Prof C N R Rao, Prof S K Pati and Dr A Sundaresan (JNCASR)

International School on *"Understanding Molecular Simulation"* January 22-27, and International Conference on *"Nucleation, Aggregation and Growth"*, January 29-31, 2007, Prof Srikanth Sastry (JNCASR).



EXTENSION ACTIVITIES

1. Summer Research Fellowships/ Department of Science Technology Fellowships/ Rajiv Gandhi Science Talent Research Fellowships

The Centre offers summer fellowships for two summer months to bright undergraduate and M Sc students (renewable for a second year for selected students). This programme has proved to be popular and competitive; each year, about 5000 students from all over India apply for the 120 fellowships awarded. Fifty fellowships are supported by the Department of Science Technology, Government of India, fifteen by the Rajiv Gandhi Institute of Contemporary Studies, New Delhi and the rest by the Centre. Students are placed with research groups at the Centre or with scientists elsewhere in India. They are paid travel expenses and a monthly stipend of Rs. 4,000/-.

The following is the list of institutions where students have been placed during 2006-07 :

Advanced Centre for Treatment, Research and Education in Cancer, Mumbai
Banaras Hindu University, Varanasi
Bose Institute, Kolkata
Central Drug Research Institute, Lucknow
Central Electrochemical Research Institute, Karaikudi
C.G.S. Indraprastha University, Delhi
Harishchandra Research Institute, Allahabad
Indian Institute of Chemical Technology, Hyderabad
Indian Institute of Science, Bangalore
Indian Institute of Technology, Chennai
Indian Institute of Technology, Delhi
Indian Institute of Technology, Kanpur
Indian Institute of Technology, Mumbai
Indian Statistical Institute, Bangalore
Institute of Genomics & Integrative Biology, Delhi
Institute of Microbial Technology, Chandigarh
Institute of Mathematical Sciences, Chennai
Jawaharlal Nehru University, New Delhi
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
National Aerospace Laboratory, Bangalore
National AIDS Research Institute, Pune
National Brain Research Centre, Haryana
National Centre for Cell Science, Pune
National Centre for Biological Sciences, Bangalore
National Centre for Plant Genome Research, New Delhi
National Chemical Laboratory, Pune
National Institute of Oceanography, Goa
Nicholas Piramal Research Centre, Mumbai
Raman Research Institute, Bangalore
Regional Research Laboratory, Thiruvananthapuram
Saha Institute of Nuclear Physics, Kolkata
S N Bose National Centre for Basic Sciences, Kolkata
Tata Institute of Fundamental Research, Mumbai
Tuberculosis Research Centre, Chennai
University of Delhi, South Campus, Delhi
University of Hyderabad, Hyderabad
University of Pune, Pune.
University of Hyderabad, Hyderabad
University of Pune, Pune.

2. Academic Exchange Programme

As part of the academic exchange programme, the following scientists/scholars carried out collaborative work with scientists of the Centre and the Indian Institute of Science for varying periods during the year under report.

Visiting Scholars

Mr Jun Hee Lee
Seoul National University
Seoul, Korea

Ms Barabara Aubertin

National School of Engineers (ENSICAEN)
France

Ms Tal Honig

Weizmann Institute of Science
Israel

3. Visiting Fellowships

The Centre offers Visiting Fellowships to research scientists in educational institutions and R&D laboratories, tenable for 2-3 months, to work with the faculty and honorary faculty of the Centre.

The following were offered Visiting Fellowships during 2006 - 2007 to work at the institutions as indicated below:

Name and address of the visitors	Collaborating with
Dr G Vivekanandan AVC College Mayiladuturai, Tamil Nadu	Prof C N R Rao CPMU, JNCASR
Dr R R N Sailaja Bhattacharya TERI Southern Regional Centre, Bangalore	Prof G U Kulkarni CPMU, JNCASR
Dr R Nagalakshmi Nehru Memorial College Tiruchirappalli	Prof N Chandrabhas CPMU, JNCASR
Dr C Venkateswaran Dept. of Nuclear Physics University of Madras, Chennai.	Dr A Sundaresan CPMU, JNCASR
Dr Vikas Baburao Patil Dept. of Physics, Solapur University Maharashtra	Prof A K Sood Dept. of Physics IISc., Bangalore
Dr Swarnamala Sirsi Yuvaraja's College, University of Mysore, Mysore.	Prof Swapan K Pati TSU, JNCASR
Mr Prashant M Shevgaonkar Viswakarma Institute of Technology, Pune.	Prof Umesh V Waghmare TSU, JNCASR
Dr Johnsy George Defence Food Research Laboratory, Mysore	Dr M Eswaramoorthy CPMU, JNCASR
Dr P Seema Nair Amrita Institute of Medical Sciences Kochi, Kerala.	Prof Maneesha S Inamdar MBGU, JNCASR



4. Project Oriented Chemical Education (POCE)

As part of their on-going programme, five students of POCE-2006 came to JNCASR and worked with faculty members on small projects during their mid-semester break.

Two students of POCE-2005 (along with colleagues in JNC) have published research papers in international journals.

A College Chemistry Kit for the benefit of P.U. Science students was developed and a one-day workshop "On College Chemistry Kit" was conducted on January 24, 2007. Ten students and five teachers from five different colleges participated in the workshop and the workshop was quite a success.

5. Project Oriented Biological Education (POBE)

POBE was conceived of as an add-on adjunct to the large body of factual information students typically imbibe during their undergraduate curriculum in some field of biology. Consequently, the focus in POBE was on equipping the selected students with the conceptual, experimental and inferential tools that would help them in subsequent research work.

In 2006, the first year of the programme, ten outstanding students (6 female, 4 male) from Delhi, Kolkata, Pune, Mumbai and Bangalore were selected out of about 300 applicants from all over the country. For the first year of the programme, it was considered to be a good response. All ten students joined the programme, which was conducted from 16 May to 8 July 2006. The programme consisted of eight one-week long modules both lectures and practical work, conducted by the faculty of JNCASR, assisted by some research scholars of the Centre, especially for practicals. In addition, five guest faculty from IISc and Mysore University conducted day long interactive sessions with the students. During this first year, certain laboratory equipments and computers were also procured. In the coming year, certain minor equipments will be added to the POBE laboratories so that nearly all experiments for the new batch of first year students can be conducted at the POBE rooms, and we have two rooms (POBE I & II) made completely functional for the use of POBE students each year.

Advertisement for the POBE-2007 has been placed in several newspapers and on the website of JNCASR. Ten outstanding students from across the country have been selected and the programme will start during mid-May 2007 for about 8 weeks. Second year students will begin their training wherein they spend about two months, mostly in laboratories in MBGU and EOBU, in addition to attending special lectures and seminars at the Centre.

6. Science Education Programme

National Science Day: The National Science Day was celebrated on February 28, 2007. About 120 students and 10 teachers from 5 local schools participated. The programme consisted of lectures and multimedia presentations on topics ranging from global warming and climate change to gene expression. Our Centre's highly distinguished faculty and staff actively interacted. The school students and teachers visited a few chemistry laboratories at the Centre and had an opportunity to take a look at current research activities.

RESEARCH PROGRAMMES

1. Research Areas

There are ongoing research programmes in several frontier, interdisciplinary areas of science and engineering. The main areas of research interest at present are:

- Chemistry of Materials
- Molecular Modelling of Materials
- Raman Spectroscopy, Brillouin Scattering and High-Pressure Research
- Nanomaterials and Catalysis
- Experimental Nonoscillation, Electronic Charge Density from Molecular Crystals
- Organic Electronics and Optoelectronic Device
- Physics and Photophysics
- Solution processing and Patterning
- Soft Matter and Hard Properties
- Biophotonics
- Synthesis and Study of Novel Functional Oxides
- Superconductivity, Magnetism and Ferroelectricity
- Aerospace and Atmospheric Fluid Mechanics
- Computational Fluid Dynamics
- Granular Flow
- Complex Fluids : From 'Microscopic' to 'Hierarchical' Modelling
- Flow Instabilities and Transition to Turbulence
- Fluid Mechanics and Heat Transfer
- Dynamics, Rheology and Stability of Complex Fluids
- Biomechanics
- Chronobiology and Animal Behaviour
- Evolutionary Genetics
- Small population and Metapopulation dynamics
- Circadian Rhythms in Fruit Flies, Ants and Mice
- Neotectonics and Environmental Geology
- Chromatin Biology and Genomics
- Towards Understanding the Molecular Genetic and Cellular Mechanisms of Human Diseases
- Protein Engineering and Molecular Parasitology
- Molecular, Genetic and Developmental Analysis of the Cardiovascular System
- Transcription Regulation in Humans with Special Emphasis on Diseases
- HIV-1 Subtype-C Strain: Success Story of the Fittest Viral Subtype
- Mechanism of Chromosome Segregation: A Molecular Approach
- *Plasmodium falciparum* : Functional Genomics of Metabolic Pathways
- Antimalarial Drug Development and Molecular Epidemiology
- Equilibrium and Nonequilibrium Statistical Mechanics of Condensed-Matter and other Complex Systems
- Condensed Matter Theory : *Ab initio* Investigations of Low-Dimensional Systems
- Advanced Quantum Theory: From Molecules to Extended Materials
- Dynamics and Phase Transformations in Disordered Systems: Liquids, Glasses and Biomolecules
- Computational Materials Theory: From Electronic Motion to Macroscopic Properties of Materials
- Isolation and Structure Determination of Unusual Peptides from Fungal Sources
- Effect of Signal Peptide on the Stability and Folding Kinetics of Maltose Binding Protein
- Design of Temperature Sensitive Mutants
- Total Synthesis of Complex Bioactive Natural Products
- Cationic Surfactants, Novel Lipids and Nucleic Acid Analogs
- Bile Acid Chemistry
- Electronic Structure, Especially Strongly Correlated Electron Systems



2. Research Facilities

The Centre has procured the following research equipment/facilities during the year 2006-2007.

- ✓ Bruker AXS X-Ray Diffractometer System D8 Discover
- ✓ IBM Think Centre A52 Comp. System
- ✓ Water Chiller Model JK DR 40 A1SS
- ✓ UNI Lab Glove Box Work Station
- ✓ Excimer Laser & Accessories
- ✓ Nucleofector Device, Accessories
- ✓ MJ Mini 40 Well Thermal Cycler
- ✓ Veeco Multimode V SPM , Bioscope AFM, Stylus Profiler
- ✓ Nikon Japan Trinocular 801 and DPL Universal Accessories
- ✓ Imaging Spectroscope with Accessories
- ✓ PCR Machine DNA Engine Thermal Cycler
- ✓ Eppendorf Refrigerated Centrifuge
- ✓ ULT 1786 9V Revco Ultima Ultra Low Temp. Freezer
- ✓ Stereo Lumar Stereo Fluorescence Microscope
- ✓ Live Cell Imaging System with Motorized Inv. Microscope
- ✓ Axiovert 200M, Motorized Inverted Microscope
- ✓ Inverted FL. Research Microscope
- ✓ FacsCalibur Single Laser (3 Column)
- ✓ 1800 Deg Max. Temperature Chamber, Heating Elements
- ✓ High Performance Computing Cluster with 6 Teraflops
- ✓ Theoretical Peak Performance with 32 Terabyte Parallel File System Storage for CCMS
- ✓ Heraeus CO2 Incubator, Spares, Gas Cylinder Monitor
- ✓ 1179B Mass Flow Controller
- ✓ VP-ITC Microcalorimetry System
- ✓ High Temperature Furnace 240 Volts
- ✓ Bio Dot SP Apparatus
- ✓ Vacuum Concentrator, Rotor, Refg. Vapor Trap
- ✓ Elma Sonic Ultrasonic Cleaner with Lid
- ✓ GL Attachment for Existing Olympus Inverted Microscope
- ✓ Turbo Molecular Pump, Ele. Frequency Converter
- ✓ 2701/E DMM/Data & 7702 40 Channel Multi
- ✓ UV-VIS Spectrophotometer ND 1000
- ✓ Thermosavant Vac. Concentrator, Rotor, Vapor Trap
- ✓ Semi Dry Western Blot Apparatus Cat#11-093-41
- ✓ Drosophila Activity Monitor, Power Supply Interface Unit
- ✓ Hitachi Model High Speed Centrifuge
- ✓ 2100 Bio Analyzer System
- ✓ Multiview 400, MV4000 Base, Confocal Illuminator Etc
- ✓ Motion Pro Camera with Shipping Case, Tripod
- ✓ Optical Chopper System
- ✓ Air Jacketed Incubator, UV System Kit, Automatic CO2 Cylnd
- ✓ Julabo Refrigerated & Heating Circulator
- ✓ NIS 70 3D Flat Scanner with Data Transmission Module

3. Sponsored Research

Sl. No.	Investigator	Title	Funding Agency	Duration
1.	Anuranjan Anand	Molecular genetic basis of hot water epilepsy	ICMR	3 years
2.	Swapan K Pati	Electronic transport in molecular nano-systems	DST	3 years
3.	Srikanth Sastry	Swarnajayanthi Fellowship	DST	5 years
4.	Anuranjan Anand	Deafness in India : A network mission towards understanding the genes and mutations and their clinical outcomes	DBT	3 years
5.	Srikanth Sastry	Understanding the landscape of glass forming systems	IFCPAR	3 years
6.	Ranga Uday Kumar	Efficacy and safety evaluation of siddha Medicines HIVS-2003 for HIV/AIDS	DST and Vedic Drugs Ltd.	2 years
7.	R Narasimha	Research Programme on Flow Instabilities	DRDO	3 years
8.	Umesh V Waghmare	Electroactive Polymers (EAP) and Composites – The DuPont Young Faculty Programme	DuPont	One year
9.	Co-ordinated by JNCASR	Postdoctoral Fellowship in Nano Science and Technology	DST	2 years
10.	Maneesha S Inamdar	Genome-wide transcriptional profiling and Pathway analysis in embryonic stem cells and the vasculature	DBT	3 years
11.	C N R Rao	The Science Outreach Programme	DAE/BRNS	3 years
12.	C N R Rao	Publication of series on Learning Science in English	INSA	
13.	Hemalatha Balam	NMITLI Project on "Improved Genome Annotation through a combination of Machine learning and experimental methods: <i>Plasmodium falciparum</i> as a case study	CSIR	3 years
14.	Ranga Uday Kumar	Functional Analysis of the NF-kB Polymorphism in the terminal repeat of HIV-1 subtype-C viruses	DBT	3 years
15.	Hemalatha Balam	Molecular dissection of the purine salvage Pathway in <i>plasmodium falciparum</i> : Essentially of HGPRT, IMPDH and ADSS in purine necleotide synthesis	CSIR	3 years
16.	Ranga Uday Kumar	Developing an indigenus and cost effective CD4 and CD8 count assy for HIV/AIDS	DST/2 years MIPL	
17.	Ranga Uday Kumar	Immunological and molecular characterization of HIV-1 Tat and long terminal repeat (LTR) cloned from Indian patient with and without dementia and/or opportunistic infection	ICMR	3 years
18.	Amitabh Joshi	Towards a realistic model of insect population growth in the single and metapopulation level: <i>Drosophila</i> as a model system	DST3 years	
19.	M R S Rao	Nuclear Import Machinery of Male Haploid Germ Cells: A study with Transition proteins TP1 and TP2	DBT	3 years



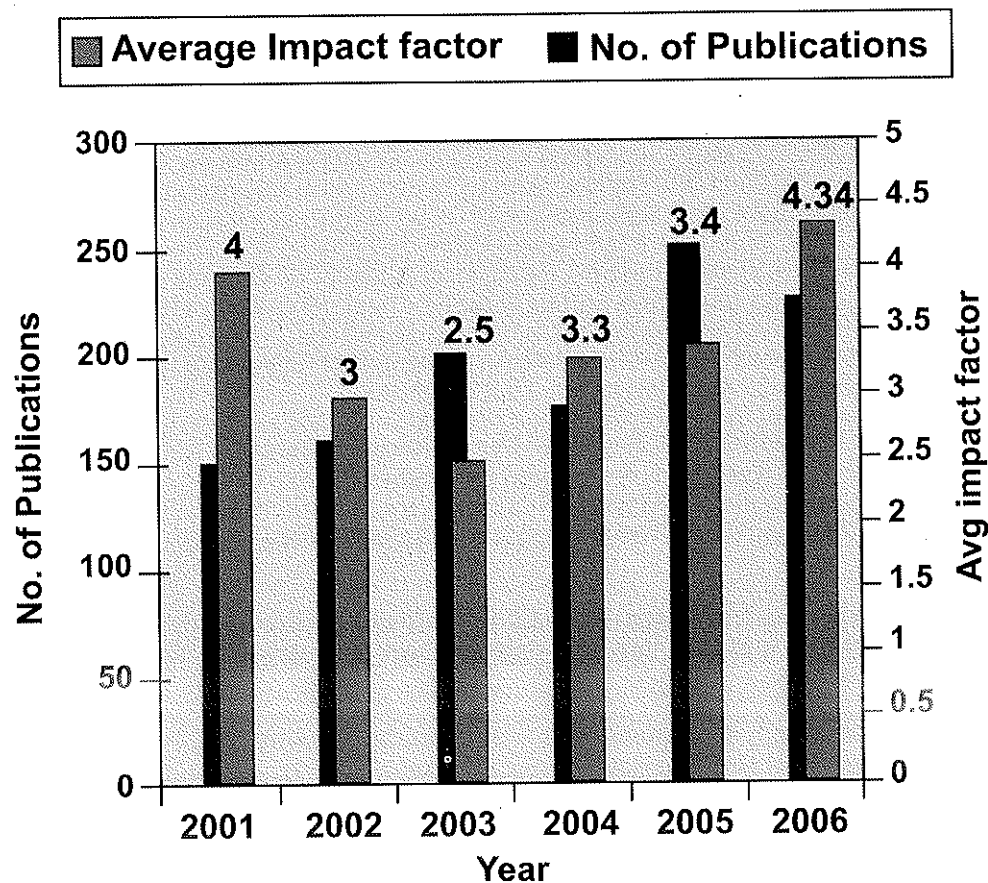
20.	Rama Govindarajan	An analysis of the vortical density stratified flow	NPOL	2 years
21.	K R Sreenivas	Study of turbulent shear flows in Stratified medium	NPOL	2 years
22.	S Balasubramanian	Computer simulation studies of room temperature ionic liquids	DST	3 years
23.	R Narasimha	Novel Transition	DRDO/ IDS	5 years
24.	S Balasubramanian	Simulation studies of structure, Dynamics and solute-solvent interactions in super-critical carbon dioxide	CSIR	3 years
25.	Maneesha S Inamdar	Expression and Functional analysis of the Drosophila HOMOLOG of rudhira, A Novel WD40 Protein involved in Hematopoiesis	CSIR	3 years
26.	Tapas Kumar Kundu	Role of multifunctional human transcriptional coactivator PC4 in Chromatin Organization, cell cycle and apoptosis in vivo "National Bioscience Award 2004-05"	DBT	3 years
27.	Anuranjan Anand	Functional Characterization of deafness-causing mutations at the Connexin-26 gene, the most common cause of hereditary deafness in Indian populations	NIHH	1 year
28.	Tapas Kumar Kundu	Chromatin modifications (Methylation, Acetylation, Deacetylation) – a new target for Cancer therapy and diagnostics	DBT	3 years
29.	Shobhana Narasimhan	Effect of Local Environment on Catalytic Activity – Indo-Italian Research project Under the AEGIS of Indo-Italian POC in S&T 2005-07	DST	3 years
30.	Tapas Kumar Kundu	Functional genomics of Human Transcriptional cofactors and histone deacetylases- A special reference to cancer	ICMR	3 years
31.	Ranga Udaykumar	Pathogenic relevance of Extracellular tat in the body fluids of HIV-1 seropositive subjects to disease progression	DBT	3 years
32.	Tapas Kumar Kundu	The Role of Anti-Cancer DNA Binding Drugs on Chromatin Organization and Function	DAE	3 years
33.	Maneesha S Inamdar	Training and research facility for human embryonic stem and human embryonic carcinoma cells	DBT	3 years
34.	Namita Surolia	X-ray Crystallographic Analysis of the Proteins involved in the Fatty Acid Biosynthesis of <i>Plasmodium falciparum</i>	DBT	3 years
35.	A Sundaresan	Atomic Engineering of High to Superconductors by layer by-layer deposition of $A_{n-1}CuO_2$ (A=Ba, Sr, Ca) infinite layers	CSIR	3 years
36.	M R S Rao	NMITLI Project on "A prospective study to correlate gene signatures with clinical outcome of astrocytomas and identification of potential therapeutic target(s) under the New Millennium Indian Technology Leadership Initiative Scheme	CSIR	3 years
37.	Anuranjan Anand	Whole Genome-based Studies to Identify Novel Molecular Genetic Pathways Causing Human Epilepsy Syndrome - DAE-SRC Outstanding Research Investigator Award	DAE	5 years

38.	S Balasubramanian	Centre for Computational Materials Science	DST	5 years
39.	C N R Rao	CSIR-COE	CSIR	5 years
40.	C N R Rao	Collaborative projects between JNCASR and DRDO	DRDO	5 years
41.	Namita Surolia	Genetic manipulations and apcoplast targeting studies with Plasmodium Type II FAS Proteins	DBT	3 years
42.	Namita Surolia	National facility for screening drugs and their biological effects for Cancer, AIDS and Malaria	DBT	3 years
43.	Coordinated by JNC (N Chandrabhas)	Lattice dynamical and structural study of Be based II- VI Semiconductor alloys	IFCPAR	1 year
44.	M R S Rao	J C Bose Fellowship to Prof M R S Rao	DST/ JCB	5 years
45.	C N R Rao	Spectroscopic Investigation of dip pen nanolithography pattern – Indo-Italian Project	DRDO	3 years
46.	Ranga Uday Kumar	Delineating viral determinants of HAD using SCID mice	AECOM	21/2 yrs
47.	Ranga Uday Kumar	Design and characterization of stable folded fragments/derivatives of HIV env for use as Immunogens	DBT	3 years
48.	Taps Kumar Kundu	Structure function analysis of Tumor suppressor, p53 interacting proteins: structural basis of p53 activation	DBT	3 years
49.	Maneesha Inamdar	Gene targeting of the mouse asrij locus to generate knockout mice for functional analysis	DST	3 years
50.	Kaustuv Sanyal	Characterization of an evolutionarily conserved kinetochore protein Mtwlp: A tool to analyse kinetochore structure of the human fungal pathogen candida albicans	CSIR	3 years
51.	Namita Surolia	Development of triclosan for treating human malaria and inhibitors of fatty acid synthesis especially enoyl-ACP reductases as anti-malarial agents	DBT	2 years
52.	Swapan K Pati	Quantum magnetic mixing effects in fully frustrated magnets – India-Japan Cooperative Science Programme	DST	2 years
53.	Namita Surolia	Structure-activity relationship of Plasmodium falciparum B-Ketoacyl-ACP reductase(FabGO)	DST	3 years
54.	K B Sinha	Bhatnagar Fellowship – 2005 Award to Prof K B Sinha “Quantum mechanics – A Mathematical tool to study non-equilibrium Processes and dissipative systems in Physical Sciences, Geometry and Information Theory”	CSIR	5 years
55.	Coordinated by JNCASR	Developing a CD version of popular science material on Nano Science & Technology for School children	DST	
56.	K R Sreenivas	Investigation of Lift and Thrust in Asymmetric Flight	DST	3 years
57.	Namita Surolia	Functional Genomics based approach to novel anti-malarial targets and agents	ICMR	3 years



PUBLICATIONS

The Center has registered a very good progress in its publications. A chart showing the year-wise publication and the impact factor thereof is appended below:



1. Research Publications of Units

(i) Chemistry and Physics of Materials Unit

1. Behera JN, Rao CNR. A Ni^{2+} ($S = 1$) kagome compound templated by 1, 4-diazacubane. *J. Am. Chem. Soc.*, 128, 9334, 2006.
2. Cheetham AK, Rao CNR. Structural diversity and chemical trends in hybrid inorganic – organic framework materials. *Chem. Commun.* (Feature article), 4780, 2006.
3. Dan M, Cheetham AK, Rao CNR. Diverse structures and dimensionalities in hybrid frameworks of strontium and lanthanum with isomeric hydroxybenzoates. *Inorg. Chem.*, 45, 8227, 2006.
4. Behera JN, Rao CNR. Synthesis and magnetic properties of an amine-templated Fe^{2+} ($S = 2$) sulfate with a distorted kagome structure. *Inorg. Chem.*, 45, 9475, 2006.
5. Behera JN, Rao CNR. Amine-templated metal sulfates with chain structures including a mixed-valent Fe compound with a half-kagome structure. *Chem. Asian. J.*, 1, 742, 2006.
6. Shenoy VB, Sarma DD, Rao CNR. Electronic phase separation in correlated oxides: The phenomenon, its present status and future prospects. *Chem. Phys. Chem.* (Mini Review), 7, 2053, 2006.

7. Edwards PP, Rao CNR, Kumar N, Alexandrov S. Possibility of a liquid superconductor. *Chem. Phys. Chem.*, 7, 2015, 2006.
8. Serrao CR, Krupanidhi SB, Waghmare U, Kundu A, Rao CNR. InMnO₃, a biferroic. *J. Appl. Phys.*, 100, 076104, 2006.
9. Sharma RB, Late DJ, Joag DS, Govindaraj A, Rao CNR. Field emission properties of B- and N-doped carbon nanotubes. *Chem. Phys. Lett.*, 428, 102, 2006.
10. Rout CS, Ganesh K, Govindaraj A, Rao CNR. Sensors for the nitrogen oxides, NO₂, NO and N₂O based on In₂O₃ and WO₃ nanowires. *Appl. Phys. A.*, 85, 241, 2006.
11. Rout CS, Govindaraj A, Rao CNR. High-sensitivity hydrocarbon sensors based on tungsten oxide nanowires. *J. Mater. Chem.*, 16, 3936, 2006.
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16. Kalyanikutty KP, Nikhila M, Maitra U, Rao CNR. Hydrogel-assisted synthesis of nanotubes and nanorods of CdS, ZnS and CuS showing some evidence for oriented attachment. *Chem. Phys. Lett.*, 432, 190, 2006.
17. Kumaramangalam R V, Iyo A, Sundaresan A, Krupanidhi SB, Rao CNR. Ferroelectricity in Bi₂₆ M_xO_{40-d} (M = Al and Ga) with the g-Bi₂O₃ structure. *Solid State Commun.*, 140, 42, 2006.
18. Sundaresan A, Bhargavi R, Rangarajan N, Rao CNR. Ferromagnetism as a universal feature of nanoparticles of the otherwise nonmagnetic oxides. *Phys. Rev. B.* 74, 16136R, 2006.
19. Pavan Kumar GV, Ashok Reddy BA, Arif Md, Kundu TK, Chandrabhas N. Surface Enhanced Raman Scattering Studies of Human Transcriptional Coactivator p300. *Journal of Physical Chemistry B*, 110, 16787-16792, 2006.
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(viii) Condensed Matter Theory Unit

1. Arti Garg, Krishnamurthy HR, Mohit Randeria. Can correlations drive a band insulator metallic? *Phys. Rev. Lett.*, 97, 046403, 2006.
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3. Martin R. Galpin, David E. Logan, Krishnamurthy HR. Dynamics and Transport of capacitively coupled double quantum dots. *J. Phys. : Condens. Matter* , 18 6571, 2006.
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Articles/Chapters in Books and Papers Presented at Conferences

1. Viswanatha R, Sarma DD. Growth of Nanocrystals in Solution, Invited Book chapter in "Nanomaterials Chemistry: Recent developments and new directions" Rao, Müller and Cheetham (Eds.) Wiley-VCH, Germany, 2007.



2. Research Publications of Honorary Faculty/Endowed Professors

1. Sivapriya K, Chandrasekaran S. New Conformationally Locked Thioderivatives of Mannose: Synthesis, Applications and Mechanistic Studies. *Carbohydr. Res.*, 341, 2204-2210, 2006
2. Suresh Kumar D, Susama Maity, Chandrasekaran S. Synthesis of Enantiopure Bis-Aziridines, Bis-Epoxydes, and Aziridino-Epoxydes from D-Mannitol. *Tetrahedron*, 62, 10162-10170, 2006.
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4. Chattopadhyay A, Jafurulla M, Pucadyil TJ. Ligand Binding and G-protein Coupling of the Serotonin_{1A} Receptor in Cholesterol-enriched Hippocampal Membranes. *Biosci. Rep.*, 26: 79-87, 2006.
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7. Raghuraman H, Chattopadhyay A. Effect of Ionic Strength on Folding and Aggregation of the Hemolytic Peptide Melittin in Solution. *Biopolymers*, 83, 111-121, 2006.
8. Paila YD, Chattopadhyay A. The Human Serotonin_{1A} Receptor Expressed in Neuronal Cells: Toward a Native Environment for Neuronal Receptors. *Cell. Mol. Neurobiol.* 26, 925-942, 2006.
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11. Dasgupta C, Valls OT. Phase diagram of vortex matter in layered high-temperature superconductors with random point pinning. *Phys. Rev. B*, 74, 184513, 2006
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13. Gupta N, Deb BM. Quantum dynamics of an electron moving in coupled quartic and coupled double-well oscillators under intense laser fields. *Chem. Phys.*, 327, 351, 2006.
14. Deb BM. Chemical sciences education at the M.Sc. level : What do we want and how do we go about it?. *Curr. Sc.*, 91, 267, 2006.
15. Gupta N, Deb BM. Does the classically chaotic Henon-Heiles oscillator exhibit quantum chaos under intense laser fields? *Pramana-J. Phys.*, 67, 1055, 2006.
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32. Chattopadhyay A, Paila YD. Lipid-protein Interactions, Regulation and Dysfunction of Brain Cholesterol. *Biochem. Biophys. Res. Commun.*, 354, 627-633, 2007.
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35. Saini S, Deb BM. A computational study of the interaction of [7]-helicene with alkali cations and benzene. *Indian J. Chem.* 46A, 9, 2007.



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40. Ganapathy R, Rangarajan G, Sood AK. Granger causality and cross recurrence plots in rheochaos. *Physical Review E*, 75, 016211, 2007.
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43. Kalipatnapu S, Chattopadhyay A. Membrane Organization of the Serotonin_{1A} Receptor Monitored by a Detergent-Free Approach. *Cell. Mol. Neurobiol.* 2007 (in press).
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45. Sajimon MC, Ramaiah D, Suresh CH, Adam W, Lewis FD, George MV. Photochromic Dibenzobarrelenes: Long-Lived Triplet Biradical Intermediates. *J.Amer.Chem. Soc.* 129, 2007 (in press).
46. Saravanan M, Vasu K, Kanakaraj R., Rao DN, Nagaraja V. R.KpnI, an HNH superfamily REase exhibits differential DNA discrimination at non-canonical sequences in the presence of Ca²⁺ and Mg²⁺. *Nucl. Acids Res.*, 32, . 2007 (in press)

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1. Wadehra A, Deb BM. One-dimensional non-linear oscillators as models for atoms and molecules under intense laser fields, in *Current Topics in Atomic, Molecular and Optical Physics*, Sinha C, Bhattacharya SS (Eds.), World Scientific, Singapore, 2007.
2. Gadagkar R. Subaltern Insect Societies – A Review of –*The Other Insect Societies* by James T. Costa, The Belknap Press of Harvard University Press, Cambridge, Massachusetts and London Science, 314, 1391, 2006.
3. Gadagkar R. The Evolution of a Biologist in an Interdisciplinary Environment. In: *25 Jahre Wissenschaftskolleg zu Berlin 1981-2006*, Grimm, D. and Meyer-Kalkus, R., (Eds.) Berlin, Akademie Verlag, pp.167-180, 2006.
4. Gadagkar R, Nowotny H. Konflikt oder Kooperation. Strategien tierischer und menschlicher Gemeinschaften. In: *Thema: Warum Krieg? Texte und Protokolle zum Briefwechsel Albert Einstein – Sigmund Freud*, von Schlebrügge, J. (Ed.) Bruno Kriesky Forum für internationalen Dialog, pp.160-170. 2006.

3. Books/ Proceedings authored/edited by Faculty

1. Bhatia V, Narayan KS. *Photoconducting Devices* - (Invited Article for Wiley Encyclopedia of Biomedical Engineering 2006).
2. Rama Govindarajan (ed.): *Sixth IUTAM Symposium on Laminar-Turbulent Transition, Fluid Mechanics and its Applications* Vol. 78, Springer, 2006.
3. Swaminathan V, Ashok Reddy BA, Selvi R, Sukanya MS, Kundu TK. *Small Molecule Modulators in Epigenetics: Implication in gene expression and therapeutics. Chromatin and Disease.* Springer Press, 2006.
4. Boulard M, Bouvet P, Kundu TK, Dimitrov S. *Histone variant nucleosomes: structure, function and implication in disease. Chromatin and Disease.* Springer Press, 2006.
5. Shandilya J, Gadad S, Swaminathan V, Kundu TK. *Histone chaperones in chromatin dynamics: Implication in disease manifestation. Chromatin and Disease.* Springer Press, 2006.
6. Batta K, Das C, Gadad S, Shandilya J, Kundu TK. *Reversible acetylation of Non Histone proteins: Role in cellular function and disease. Chromatin and Disease.* Springer Press, 2006.
7. Rao CNR, Thomas PJ, Kulkarni GU, *Nanocrystals – Synthesis, Properties and Applications*, Springer-Verlag, 2007 .
8. Rao CNR, et al. , (Eds) *Nanomaterials Chemistry: Recent Developments* , Wiley-VCH, 2007.
9. Helaine Selin, Narasimha R (Eds): *Encyclopaedia of Classical Indian Sciences.* Universities Press (India) Hyderabad. 2007.
10. Narasimha R, Kumar A, Cohen S, Guenther R. (Eds): *Science and Technology to Counter Terrorism.* (U.S.) National Academy of Sciences/National Institute of Advanced Studies, March 2007.
11. Kundu TK, Dipak Dasgupta (Eds.) . *Chromatin and Disease. Chapters contributed by Kundu TK,* Springer Publications, 2007.
12. Narayan KS, Dutta S. *Molecular Approaches in Organic/Polymeric Field-Effect Transistors–Nanomaterials Chemistry: Novel aspects and New Directions* (Eds.) C.N.R. Rao, Achim Mueller and Prof. A.K. Cheetham (to be published by Wiley-VCH)
13. Valdiya, K.S. *The Making of India: Geodynamics Evolution*, Macmillan, New Delhi. (in press)

4. Books/ Proceedings authored/edited by Hon. Faculty

1. Bhattacharya S, Maitra U, Mukhopadhyay S, Srivastava A. Chapter in book entitled: “*Advances in Molecular Hydrogels*”, pp. 613 in “*MOLECULAR GELS: Materials with Self-Assembled Fibrillar Networks*”, Richard G. Weiss, Pierre Terech (Eds), Springer, Dordrecht, The Netherlands, 2006.
2. Kalipatnapu S, Pucadyil TJ, Chattopadhyay A. Membrane Organization and Dynamics of the Serotonin_{1A} Receptor Monitored using Fluorescence Microscopic Approaches in *Serotonin Receptors in Neurobiology*, New Frontiers in Neuroscience series (Chattopadhyay, A., Ed.), CRC Press, 2007. (in press).
3. Chattopadhyay A. Serotonin Receptors in Neurobiology, *New Frontiers in Neuroscience* series (series editors: Simon, S.A., and Nicoletti, M.A.L.), CRC Press, 2007 (in press).



AWARDS/DISTINCTIONS

The following faculty and honorary faculty members of the Centre have received various distinctions and awards both at the national and international level in recognition of their significant contributions to the progress of science and technology.

Awards & Honours

Prof C N R Rao

India Citation Laureate 2006, Thomson/ISI, USA
Doctor of Science (Honoris Causa), University of Stellenbosch, South Africa
Doctor of Science (Honoris Causa), Uttar Pradesh Technical University, Lucknow
Doctor of Science (Honoris Causa), University of Delhi
Hon. Fellowship, Institute of Physics, London, 2006
INSA Medal for promotion and service to science, 2006
Honorary Doctorate, University of Oxford
D Sc (*Honoris Causa*), Kalyani University, West Bengal.
Hon. Fellowship, St. Catherine's College, Oxford, 2007.

Prof M R S Rao

Sir M Visveswariah Award of the Government of Karnataka

Prof M K Chandrashekar

Millenium Plaque of the Indian Science Congress.

Prof N Chandrabhas

MRSI medal 2007

Dr A Govindaraj

Sir C V Raman Young Scientist Award, 2005.

Prof Rahul Pandit

Meghnad Saha Award in Theoretical Sciences (of the UGC
- awarded in 2006 for the year 2004)

Prof Swapan K Pati

The Bronze medal of the Chemical Research Society of India, 2007.

Prof Umesh V Waghmare

B M Birla Science Prize in Physics for the year 2005.

Prof K S Valdiya

Padmashree from the Government of India, 2007
Distinguished Alumnus Award, Lucknow University, 2006

Prof N K Ganguly

Doctorate of Science (D.Sc.) (*honoris causa*) Guru Nanak Dev University, Amritsar 2007
FMedSci, Imperial College Faculty of Medicine, London, 2006
Fellow, Department of Biotechnology, Ministry of Science & Technology,
New Delhi. 2007
Shanti Swarup Bhatnagar Medal (2007), Indian National Science Academy
10th Sir Ganga Ram Oration, 2006, Sir Ganga Ram Hospital, New Delhi
Life Time Achievement Award in Clinical Research, Institute of Clinical Research,
New Delhi
Sher-e-Kashmir Sheikh Abdullah Oration, Sms Medical College, Jaipur

Dr R S Gokhale

Shanti Swaroop Bhatnagar Award in Biological Sciences, 2006

Prof E D Jemmis

Prof T Navaneeth Rao National Best Teacher award of Andhra Pradesh Akademi of Sciences, 2006.

Prof N Kumar

Materials Scientist Award, MRSI.

Dr R A Mashelkar

Honorary Doctorate, Sri Venkateswara University, Tirupati, 2006

Prof Raghavendra Gadagkar

Award of Jawaharlal Nehru Birth Centenary Visiting Fellowship – 2007 of the Indian National Science Academy, New Delhi.

Prof G Rangarajan

Chevalier dans l'Ordre des Palmes Academiques (Knight of the Order of Palms) by Government of France, 2006.

Prof D D Sarma

TWAS Physics Prize 2006

Prof Sriram Ramaswamy:

G D Birla Prize for Science, 2006

Prof M Vijayan

Life Time Achievement Award, Biotech Research Society of India, 2006

Goyal Prize in Life Sciences, 2005

Distinguished Alumni Award, 2005, Indian Institute of Science

FELLOWSHIPS

Prof S Balasubramanian

Swarnayanthi Fellowship, 2006

Prof H R Krishnamurthy

J C Bose National Fellowship, 2006

Prof K S Narayan

Fellow of National Academy of Sciences, India

Prof Rahul Pandit

Fellow, Indian Academy of Sciences

Fellow, National Academy of Sciences

Prof Biman Bagchi

J C Bose National Fellowship, 2006

Prof Chandan Dasgupta

J C Bose National Fellowship, 2006

Prof Dipankar Chatterji

J C Bose National Fellowship, 2006

Prof J Gopalakrishnan

Ramanna Fellowship, DST 2006 (2007-2010)

Prof E D Jemmis

J C Bose National Fellowship, 2006



Prof Raghavendra Gadagkar

Adjunct Professor, Indian Institute of Science Education & Research (IISER), Kolkata.
J C Bose National Fellowship, 2006

Prof P T Manoharan

Ramanna Fellowship, DST, 2006

Prof G Mehta

Honorary Fellowship of the Royal Society of Chemistry, 2007.

Prof Raghavan Varadarajan

Elected Fellow, Indian National Science Academy, 2006.

Prof S Ramasesha

J C Bose National Fellowship, 2006

Prof Santanu Bhattacharya

Elected Fellow, Indian National Science Academy, 2006.

Prof D D Sarma

J C Bose National Fellowship, 2006

Prof S Yashonath

Ramanna Fellowship starting 2007

EDITORIAL BOARDS

Prof M K Chandrashekar

Member, Council of Editors, *Resonance*.

Prof Amitabh Joshi

Editor, *Journal of Genetics*.

Member, Council of Editors, *Resonance*.

Prof Vijay Kumar Sharma

Member, Council of Editors, *Journal of Circadian Rhythms*.

Member, Council of Editors, *Journal of Genetics*.

Dr Amitabha Chattopadhyay

Elected Member, *Biochimica et Biophysica Acta – Biomembranes* (Elsevier).

Prof Srikanth Sastry

Editorial Advisory Board of JStat.

Prof Rahul Pandit

Divisional Associate Editor for Physical Review Letters

Editorial Advisory Board of Physica A.

MEMBERSHIPS/APPOINTMENTS

Prof C N R Rao

Life Member, Christ Church College, Oxford, 2007

International Adviser, National Institute of Materials Science (NIMS) Japan

Visiting Professor, University of Southampton - from 2007

Prof Amitabh Joshi

External member, Faculty of Science, Delhi University.

Member, Board of Studies (PG) in Genetics, Univ. of Mysore.

Prof S M Deshpande

Consultant: ASL, Hyderabad
Consultant: HSTDV project DRDL, Hyderabad

Dr Meheboob Alam

Head, Max-Planck-India Partner Group at JNCASR (2007-2011).

Prof R Narasimha

Member, Earth Commission, Government of India
Vice-President, Ramanujan Mathematical Society
President, Working Committee, Current Science
Member, Editorial Board, Encyclopaedia of the History of Science, Technology and Medicine in Non-Western Cultures, Springer.

Prof Swapan K Pati

Young Affiliate, Third World Academy of Sciences (TWAS), 2007.
Member, 2007 - American Physical Society.
Member, 2007 - American Chemical Society

Prof Vijay Kumar Sharma

Visiting Professor, Department of Biology, New York University, New York (2006-2007).

Prof Raghavendra Gadagkar

Elected Foreign Associate, National Academy of Sciences, USA, 2006
Co-Chair, Programme Advisory and Monitoring Committee for the Projects on Biodiversity Characterization and Inventorization, Department of Biotechnology, Government of India, 2006.
Chairman, Independent, International Review Panel of The European Science Foundation EUROCORES Programme "The Evolution of Cooperation and Trading (TECT)", 2006.
Member, Scientific Advisory Committee, Society in Science: The Branco Weiss Fellowship, ETH, Zurich, 2006 – present.
Member, TWAS Membership Advisory Committee for Systems Biology, 2007-2009.

Prof M M Sharma

Elected as Foreign Associate of the U S National Academy of Engineering
Director, Central Board of the Reserve Bank of India

Prof S Yashonath

PAC member in Inorganic Chemistry, 2007

LECTURESHIPS

Prof C N R Rao

Magna Lecture, Brazilian Academy of Science, 2007

Prof R Narasimha

Satish Dhawan Lecture, "*Tropical convective boundary layers: A new approach to scaling*", 11th Asian Congress of Fluid Mechanics, Kuala Lumpur, 22 May 2006.
Invited lecture on "*Observe, numerize, theorize... Language and Epistemology in Scientific Cultures*", International Academic Workshop on "The generosity of artificial languages in an Asian perspective" Amsterdam 18-20 May 2006.
Invited lecture "*Direct Numerical Solution of the Boussinesq Equations for Cloud-like Flows*", IUTAM Symposium on "Computational Physics and New Perspectives in Turbulence", Nagoya, 13 September 2006.
Invited lecture "*Transitions on a swept leading edge*", International Symposium, Transition and Turbulence 26-28 February 2007, Texas A & M University, USA.



Prof Swapan K Pati

Invited lectures in both American Physical Society meeting (at Denver, March 4-9, 2007) and American Chemical Society Meeting (at Chicago, March 25-29, 2007)

Prof Biman Baghi

Mizushima-Raman Award Lecture of JSPS and DST delivered at Sihuoka, Japan, 2006

Prof S Chandrasekaran

2nd Endowment Lecture of Kalyani University

Prof N K Ganguly

A.C.Joshi Memorial Lecture, Panjab University, Chandigarh

Prof P T Manoharan

Chaired an International Conference (ASBIC III) in China, October 2006

Prof Raghavendra Gadagkar

Foundation Day Lecture, Centre for DNA Fingerprinting and Diagnostics, Hyderabad
Prof. U.S.Srivastava Memorial Award Lecture of the National Academy of Sciences, India, St. Joseph's College, Bangalore

Prof. Santanu Bhattacharya

Darshan Ranganathan Memorial Lecture, CRSI, New Delhi 2007

Prof D D Sarma

Dr. Jagdish Shankar Memorial Lecture of INSA, 2006.
23rd Professor R.P. Mitra Memorial Lecture, Delhi University, 2006
A.V. Rama Rao Foundation Prize Lecture, JNCASR, 2006.

Prof K L Sebastian

R.P. Mitra Memorial Lecture at Department of Chemistry, Delhi University (2007)

Prof Sriram Ramaswamy

Raja Ramanna Prize lecture 2006



FINANCIAL STATEMENTS

Name : JAWAHARLAL NEHRU CENTRE FOR
ADVANCED SCIENTIFIC RESEARCH

Address : JAKKUR POST, BANGALORE – 560 064

Year Ended : 31ST MARCH 2007

Assessment Year : 2007-08

Auditor's Report to the Members of the Governing Body of Jawaharlal Nehru Centre for Advanced Scientific Research

We have audited the attached Balance Sheet of Jawaharlal Nehru Centre For Advanced Scientific Research as at March 31, 2007 and also the Income & Expenditure Account for the year ended on that date and the Receipts and Payment account for the year ended on that date annexed thereto. These financial statements are the responsibility of the management of Jawaharlal Nehru Centre for Advanced Scientific Research. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with auditing standards generally accepted in India. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An Audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by Management as well as evaluating the overall financial statements presentation. We believe that our audit provides reasonable basis for our opinion.

We report that:

1. 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.
2. In our opinion proper books of accounts as required by law have been kept by Jawaharlal Nehru Centre For Advanced Scientific Research so far as it appears from our examination of those books.
3. The Balance Sheet, Income and Expenditure Account and Receipts and Payment account dealt with by this report are in agreement with the books of account.
4. The Balance Sheet and Income and Expenditure Account dealt with by this report are prepared in accordance with the Accounting Standards issued by the Institute of Chartered Accountants of India subject to :
 - (i) It is the policy of the entity to prepare its financial statements on accrual basis except in respect of interest income from investments made, recoveries from CSIR fellowship and SRFP and income from Royalties which are recognized as and when received rather than when earned. Non recognition of interest income, Royalty income, recoveries from CSIR fellowship and SRFP on accrual basis is not in conformity with the Accounting Standards 9 (Revenue Recognition) issued by the Institute of Chartered Accountants of India [Refer Note No.4,8 and 9 of Schedule No.24]
 - (ii) Non-Provisions of accrued liability in respect of leave encashment which is not in conformity with the Accounting, Standard 15 [Accounting for retirement benefits in the financial statements of Employers] issued by the Institute of Chartered Accountants of India. [Refer Note No.3 of Schedule No.24]
 - (iii) It is the policy and practice of the entity to deduct the amount spent on acquisition of fixed assets from the total grants/ subsidies received in the Income & Expenditure account. This is not in conformity with the Accounting Standard- 5 issued by the Institute of Chartered Accountants of India. It has been explained that this Format has been consistently used to present the the accounts before the authority who grant the funds.
5. In our opinion and to the best of our information and according to the explanations given to us and subject to notes on accounts and our qualifications in para 4 above, the said accounts give a true and fair view in conformity with the accounting principles generally accepted in India:
 - (a) in the case of Balance Sheet, of the state of affairs of the Jawaharlal Nehru Centre for Advanced Scientific Research as at March 31, 2007; and
 - (b) in the case of Income and Expenditure Account, of the excess of Income over Expenditure for the year ended on that date.

For P. V. PRABHU & CO.,
Chartered Accountants

Sd/-
(NAGARAJA)
Partner

Membership No. 205345



Place : Bangalore
Date : 17.09.2007

JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH
BALANCE SHEET AS AT 31ST MARCH 2007

Description	Schedule	Current year		Previous year	
		2006-07		2005-06	
		Rs.	Ps.	Rs.	Ps.
LIABILITIES					
Corpus/Capital Fund	1	783,814,248.54		678,204,167.44	
Reserves & Surpluses	2	44,897,975.61		9,333,602.74	
Earmarked and Endowment Funds	3	72,046,175.15		61,985,629.26	
Secured loans and Borrowings	4		0.00		0.00
Unsecured loans and Borrowings	5		0.00		0.00
Deferred Credit Liabilities	6		0.00		0.00
Current Liabilities and Provisions	7	4,929,765.45		64,756,495.35	
Other funds-Cluster Studies		39,541.00		39,541.00	
Scheme Balances		103,816,747.30		56,043,085.62	
Total		1,009,544,453.05		870,362,521.41	
ASSETS					
Fixed Assets (at gross)	8	783,814,248.54		678,204,167.44	
Investments-Endowment Funds	9	69,125,000.00		59,900,000.00	
Investment - Others	10	130,715,690.00		106,215,690.00	
Current Assets, Loans, Advances etc.	11	25,889,514.51		26,042,663.97	
Total		1,009,544,453.05		870,362,521.41	
Significant accounting policies(Enclosed)	24				
Contingent Liabilities & Notes on Accounts	25				

Schedule 1 to 25 form integral part of Accounts

For Jawaharlal Nehru Centre for Advanced Scientific Research

This is the Balance sheet referred to in our report of even date.

for **P.V. Prabhu & Co.,**
Chartered Accountants
Sd/-
(Nagaraja)
Partner
Membership no.205345

Sd/-
R.S.Gururaj
Accounts Officer

Sd/-
Prof.M.R.S.Rao
President

Place : Bangalore
Date : 17.09.2007

**JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH
INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2007**

Description	Schedule	Current year		Previous year	
		2006-07		2005-06	
		Rs.	Ps.	Rs.	Ps.
INCOME					
Income from sales / service	12		0.00		0.00
Grants/Subsidies received	13	235,297,523.00		239,505,372.00	
		235,297,523.00		239,505,372.00	
Less: Extent of fixed assests procured		105,610,081.10		63,841,023.88	
Capital Work in Progress			0.00	59,575,231.00	
		129,687,441.90		116,089,117.12	
Income from Fees/Subscriptions etc	14	801,146.00		603,003.00	
Income from investments	15		0.00		0.00
Royalty Income,Publication,Licence fee etc	16	133,667.01		449,835.00	
Interest earned	17	7,808,498.96		4,980,784.00	
Other income	18	12,503,722.00		9,692,864.00	
Increase/decrease in stocks	19		0.00		0.00
Total		150,934,475.87		131,815,603.12	
Expenditure					
Establishment expenses	20	46,232,113.00		44,340,409.00	
Other administrative expenses	21	65,302,038.00		71,827,130.00	
Expenditure on Grants,Subsidies etc	22		0.00		0.00
Interest & bank charges	23	39,036.00			0.00
Total		111,573,187.00		116,167,539.00	
Less: Overhead recoveries from schemes		4,000,000.00		4,000,000.00	
Net Expenditure		107,573,187.00		112,167,539.00	
Excess of Income over Expenditure		43,361,288.87		19,648,064.12	
Less: Transferred to Corpus Fund Account		7,796,916.00		5,956,506.00	
		35,564,372.87		13,691,558.12	
Balance brought forward		9,333,602.74		-4,357,955.38	
Balance carried to Balance sheet		44,897,975.61		9,333,602.74	
Significant accounting policies (Enclosed)	24				
Contingent Liabilities & Notes on Accounts	25				

Schedule 1 to 25 form integral part of Accounts

For Jawaharlal Nehru Centre for Advanced Scientific Research

This is the Income and Expenditure account referred to in our report of even date.

for P.V. Prabhu & Co.,
Chartered Accountants
Sd/-
(Nagaraja)
Partner
Membership no.205345

Sd/-
Prof.M.R.S.Rao
President

Sd/-
R.S.Gururaj
Accounts Officer

Place : Bangalore
Date : 17.09.2007



**JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH
RECEIPTS AND PAYMENTS ACCOUNT FOR THE YEAR ENDED 31-03-2007**

Opening Balances & Receipts	2006-07		2005-06		Payments & Closing Balances		2006-07		2005-06	
	Rs.	Ps.	Rs.	Ps.	Rs.	Ps.	Rs.	Ps.	Rs.	Ps.
I. Opening Balances:										
a. Cash in hand & Imprest at centre	69,616.00		67,519.00				42,245,417.55		44,340,409.00	
b. Bank balances:							65,131,974.00		71,827,130.00	
<i>In savings bank Accounts:</i>							900,748.11		2,694,290.00	
At Canara bank	10,071,491.35		3,637,864.13				108,278,139.66		118,861,829.00	
<i>In Deposit accounts:</i>										0.00
At IDBI bank	3,100,000.00		3,100,000.00							
At HDFC trust	8,100,000.00		12,050,000.00							
At ICICI Bank	800,000.00		800,000.00							
At Canara Bank	63,500,000.00		22,000,000.00						11,700,000.00	
	85,571,491.35		41,587,864.13						0.00	
II. Grants Received:										
From DST travel grant	0.00		170,569.00							
From DST-Grant in aid	230,000,000.00		230,000,000.00							
From DST for Building	5,000,000.00		0.00							
From DST for Meeting/Seminars	297,523.00		9,334,803.00						60,404,981.43	
On behalf of Endowments	87,618.00		658,311.00						27,566,102.26	
	235,385,141.00		240,163,683.00						168,621,354.55	
III. Income on Investments from:										
A. Interest on FD's:										
a. From Earmarked/Endowment Funds	5,241,797.00		4,841,161.10							
b. From Own funds	5,130,770.00		3,383,408.00						39,036.00	
	10,372,567.00		8,224,569.10							
IV. Interest received:										
a. On S.B A/c	336,839.96		90,705.00							
Balance Carried Over	331,735,655.31		290,134,340.23						276,938,530.21	
										218,532,912.69

Contd...)

**JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH
RECEIPTS AND PAYMENTS ACCOUNT FOR THE YEAR ENDED 31.03.2007**

Opening Balances & Receipts	2006-07 Rs. Ps.	2005-06 Rs. Ps.	Payments & Closing Balances	2006-07 Rs. Ps.	2005-06 Rs. Ps.
Balance Brought Forward	331,735,655.31	290,134,340.23	Balance Brought Forward	276,938,530.21	218,532,912.69
V. Other Income:			VII. Other payments:		
a. Royalty	10,386.01	449,835.00	Caution money deposit returned	14,000.00	4,000.00
b. Licence Fee	123,281.00	0.00	Staff advances	21,406.00	20,576.00
c. Collections from Visitors, Guest room etc	2,311,145.00	1,570,746.00	Dues paid to schemes	1,330,833.90	0.00
d. From fee, subscription etc	801,146.00	603,003.00	Contingent Advances paid	0.00	163,885.00
e. CSIR fellowships, SRFP			Other advances given	0.00	75,089.00
reimbursements	9,553,246.00	8,122,118.00	Paid to Income tax department	0.00	461,473.00
f. From others	639,331.00	0.00			
	13,438,535.01	10,745,702.00	VIII. Closing Balances:	1,366,239.90	725,023.00
VI. Amount borrowed	0.00	0.00	a. Cash in hand & Imprest at centre	274,063.00	69,616.00
VII. Other receipts:			b. Bank balances:		
Amount transferred from schemes	2,000,000.00	4,000,000.81	<i>In savings bank accounts:</i>		
Earnest money received	372,618.00	19,000.00	Canara Bank	1,719,659.21	10,071,491.35
Advances Returned back	749,192.00	0.00	Union Bank of India	4,967.00	0.00
Contingency advances returned	232,459.00	0.00	<i>In deposit accounts:</i>		
	3,354,269.00	4,019,000.81	At canara bank	48,000,000.00	63,500,000.00
			At IDBI bank	3,100,000.00	3,100,000.00
			At Union bank of India	5,000,000.00	0.00
			At HDFC trust	12,125,000.00	8,100,000.00
			At ICICI bank	0.00	800,000.00
TOTAL	348,528,459.32	304,899,043.04	TOTAL	69,949,626.21	85,571,491.35
				348,528,459.32	304,899,043.04

This is the Receipts and payments account referred to in our report of even date.

for P.V.PRABHU & Co.,
Chartered Accountants

Sd/-
(Nagaraja)
Partner

Membership no.205345

Place : Bangalore, Dated:17.09.2007

For Jawaharlal Nehru Centre for Advanced
Scientific Research

Sd/-
Prof.M.R.S.Rao
President

Sd/-
R.S.Gururaj
Accounts Officer

Schedule No. 24

Accounting Policies for the Year 2006-07

1. The fixed assets are stated at cost. The Centre has identified depreciation on Fixed Assets, and since they are created out of Grant in Aid funds, they have been classified the same in the statement of affairs under Capital Fund and also under Fixed Assets schedule respectively.
2. Grants received and utilised for procurement of Fixed Assets have been reduced from the total grants received in the Income and Expenditure Account and the same have been included under the Capital Fund Account.
3. The leave encashment to the staff members is accounted as and when it is paid.
4. Investments of the Centre are stated at cost. The interest on investment is accounted as and when they are received.
5. The foreign currency transactions are translated at the rates prevailing on the date of transaction.
6. Previous years figures have been regrouped and reclassified to read in conformity with the current year's figures.
7. The Centre has put in to operation a system whereby the accounting standards with respect to the above are brought in conformity with the mandatory accounting standards recommended by the institute of Chartered Accountants of India.
8. Royalty income has been accounted as and when received.
9. Income in respect of CSIR Fellowships and SREFP amounting to Rs.95,53,246 represents the dues received from the CSIR and Department of Science and Technology of Government of India is accounted on receipt basis. These dues pertain to earlier years where it was not provided.
10. Recoveries made on account of Over Head Charges spent for various Schemes/Projects are routed through Income & Expenditure account for proper presentation.
11. The Expenditure listed under Schedule 20 as Establishment Expenses include the salaries paid to Faculty, Scientific and Research Personnel. The Expenditure listed under the Schedule 21 as Administrative Expenses include the expenses towards Laboratory Consumables and Seminar/ Workshops/ Discussion meetings exclusively incurred for Research purposes.
12. Application for exemption from payment of Income Tax has been made and it is in the process of finalisation. Hence provision for income tax not made in the accounts.

For P.V. Prabhu & Co.,
Chartered Accountants

Sd/-
R.S.Gururaj.
Accounts Officer.

Sd/-
(Nagaraja)
Partner
Membership no.205345

Sd/-
Prof.M.R.S.Rao
President

Place: Bangalore
Date : 17.09.2007

JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH

Schedule forming part of the accounts

Description	2006-07		2005-06	
	Rs.	Ps.	Rs.	Ps.
Schedule 1: Capital Fund				
Balance as at the beginning of the year	631,456,128.44		508,039,873.56	
Carbon Nano Materials	34,182,430.00		34,182,430.00	
Physics and Chemistry of Materials	9,878,095.00		9,878,095.00	
Cluster Studies	2,687,514.00		2,687,514.00	
	678,204,167.44		554,787,912.56	
Less : Depreciation up to the end of previous year	161,610,525.00		137,033,758.00	
	516,593,642.44		417,754,154.56	
Add : Addition to Fixed Assets during 2006-07	105,610,081.10		123,416,254.88	
	622,203,723.54		541,170,409.44	
Less : Depreciation for the current year	31,685,312.00		24,576,767.00	
	590,518,411.54		516,593,642.44	
Add : Depreciation Reserve per contra	193,295,837.00		161,610,525.00	
TOTAL	783,814,248.54		678,204,167.44	
Schedule 2- Reserves And Surpluses:				
General Reserve:				
Surplus In Income and expenditure Account	44,897,975.61		9,333,602.74	
Schedule 3- Earmarked / Endowment Funds:				
A : Infrastructure Corpus Fund				
Opening Balance	25,817,316.65		19,716,139.65	
Add : Amount transferred on account of Overhead recoveries from Schemes Account	2,000,000.00		4,000,000.00	
Amount transferred from Income & Expenditure A/c	5,796,916.00		2,101,177.00	
	33,614,232.65		25,817,316.65	
B : Other funds				
Opening Balance of the Funds	36,168,312.61		34,701,494.51	
Add : Additions :				
Funds/Donations/Grants/Royalties	87,618.00		658,311.00	
Funds-Income from Investments made	3,076,760.00		3,502,797.10	
	39,332,690.61		38,862,602.61	
Less : Funds-utilisation/Expenditure incurred	900,748.11		2,265,105.00	
: Fund transferred reversed	0.00		429,185.00	
	38,431,942.50		36,168,312.61	
TOTAL	72,046,175.15		61,985,629.26	
Schedule 7- Current liabilities and provisions				
Sundry Creditors EMD	683,821.00		311,203.00	
Sundry Creditors CMD	89,185.00		103,185.00	
Sundry Creditors for Capital goods	0.00		63,011,273.45	
Sundry Creditors for others	3,986,695.45		0.00	
Statutory Liabilities	170,064.00		0.00	
Due to Scheme Account	0.00		1,330,833.90	
TOTAL	4,929,765.45		64,756,495.35	

Sd/-
R.S.Gururaj
Accounts Officer



JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH
Schedule forming part of the accounts

Description	2006-07		2005-06	
	Rs.	Ps.	Rs.	Ps.
Schedule 8: Fixed Assets				
Land - Free Hold	17,715,351.00		17,715,351.00	
Buildings :				
General	79,658,165.26		79,658,165.26	
Hostel Building	15,570,835.00		15,570,835.00	
New Lab Building - AMRL	25,930,339.00		25,377,072.00	
Animal House	5,614,415.00		5,425,605.00	
Staff Housing	4,156,168.00		4,118,031.00	
ETU Building	2,048,814.00		2,048,814.00	
Engineering & Mechanical Unit Block	4,643,669.00		0.00	
Other buildings like extn to Hostel, College etc.,	11,883,626.00		41,949,861.00	
Nano Science Block	7,042,909.00		0.00	
Extention to Pauling Building - Biology Block	4,680,084.00		0.00	
Dining Hall & Kitchen Block	4,844,910.00		0.00	
Radio Active Lab	203,233.00		0.00	
International Centre for Material Science	4,606,948.00		0.00	
Lecture Hall & Academic Block	2,393,547.00		0.00	
Hostel Phase II	19,552,377.00		0.00	
STP Building	291,699.00		0.00	
Hostel Phase III	1,433,749.00		0.00	
Security Office Block	90,373.00		0.00	
	194,645,860.26		174,148,383.26	
Infrastructure Facilities:				
Roads, Streetlights, Drainages, partitions etc	41,922,549.32		34,891,894.32	
Tubewells and water supply	248,912.00		248,912.00	
	42,171,461.32		35,140,806.32	
Plant/Machinery/Equipment:				
General	310,195,747.45		209,026,492.35	
Equipments Carbon & Nano Materials	34,182,430.00		34,182,430.00	
Equipments Physics and Chemistry of Materials	9,878,095.00		9,878,095.00	
Equipments Cluster Studies	2,687,514.00		2,687,514.00	
Equipments Advance Technology Lab	20,202,562.00		20,202,562.00	
Equipment Magnet	7,090,855.00		7,090,855.00	
	384,237,203.45		283,067,948.35	
Vehicles	1,353,847.00		1,351,027.00	
Furniture and fixtures	28,031,306.87		22,238,332.87	
Office equipment	5,436,913.63		5,380,314.63	
Computer/peripherals	25,023,948.00		19,738,867.00	
Electrical installations	12,772,109.00		3,667,276.00	
Library Books	12,094,155.21		8,281,955.21	
Library Journals	60,332,092.80		47,898,674.80	
Capital Work in Progress:				
Buildings		0.00	15,000,000.00	
Equipments		0.00	44,575,231.00	
TOTAL	783,814,248.54		678,204,167.44	
Less - Depreciation up to the end of previous year	161,610,525.00		137,033,758.00	
Depreciation for the current year	31,685,312.00		24,576,767.00	
Written down value of the assets as at the year end	590,518,411.54		516,593,642.44	
Add - depreciation reserve per contra	193,295,837.00		161,610,525.00	
TOTAL	783,814,248.54		678,204,167.44	

Note : Capital work in progress in respect of Buildings and equipment represent the firm order placed with vendors and building contractors up to the year end

Sd/-
R.S. Gururaj
Accounts Officer

JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH
Schedule forming part of the accounts

Description	2006-07		2005-06	
	Rs.	Ps.	Rs.	Ps.
Schedule 9: Investments -Earmarked/Endowment Funds				
Long Term Deposits				
Fixed Deposit with ICICI Bank		0.00	800,000.00	
Fixed Deposits and Bonds with IDBI Bank	3,100,000.00		3,100,000.00	
Fixed Deposits with HDFC Trust	12,125,000.00		8,100,000.00	
GOVERNMENT OF INDIA 8% SAVINGS BONDS 2003 (SHCIL & SBI)	47,900,000.00		47,900,000.00	
Fixed Deposits with Canara bank	6,000,000.00		0.00	
TOTAL	69,125,000.00		59,900,000.00	
Schedule 10- Investments - Others				
Short Term Deposits				
Fixed deposits with banks - Canara Bank	42,000,000.00		63,500,000.00	
Fixed deposits with banks - Canara Bank (Schemes)	83,715,690.00		42,715,690.00	
Fixed Deposits of Union Bank of India	5,000,000.00		0.00	
TOTAL	130,715,690.00		106,215,690.00	
Schedule 11 Current Assets, Loans, Advances etc.,				
Cash & Bank Balances				
Cash in hand at Centre	24,245.00		52,644.00	
Cash in hand with Schemes	125,460.00		70,922.00	
Imprest balance	24,472.00		16,972.00	
Imprest with Faculty	225,346.00		0.00	
Cash at Bank :				
Centre - Canara Bank	1,719,659.21		10,071,491.35	
Centre-Union Bank of India	4,967.00		0.00	
Schemes - Canara Bank	954,924.47		12,159,475.79	
Schemes - State Bank of India	19,020,672.83		1,096,997.83	
Advances to staff	154,867.00		133,461.00	
Contingent Advances	63,426.00		295,885.00	
Other advances	585,500.00		1,334,692.00	
TDS receivable	314,978.00		312,978.00	
Due from Schemes on Account of Overhead recoveries	2,000,000.00		0.00	
Amount recoverable from Income Tax Department	461,473.00		461,473.00	
TDS receivable -Endowments	173,852.00		0.00	
Linus and CPF accounts	35,672.00		35,672.00	
TOTAL	25,889,514.51		26,042,663.97	

Sd/-
R.S.Gururaj
Accounts Officer



JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH

Schedule forming part of the accounts

Description	2006-07		2005-06	
	Rs.	Ps.	Rs.	Ps.
Schedule 13: Grants/subsidies				
Grants - DST	230,000,000.00		230,000,000.00	
Grants - Discussion meetings/Seminars	297,523.00		9,334,803.00	
Grants - Travel grants		0.00	170,569.00	
Grants- From DST for Building(Nano Science)	5,000,000.00			0.00
TOTAL	235,297,523.00		239,505,372.00	
Schedule 14-Income from Fee/Subscriptions etc :				
Income from fee, subscriptions,medical contributions etc.,	801,146.00		603,003.00	
TOTAL	801,146.00		603,003.00	
Schedule 16-Royalty Income,Publication,Licence fee etc :				
From Royalty	10,386.01		449,835.00	
Licence fee	123,281.00			0.00
TOTAL	133,667.01		449,835.00	
Schedule 17-Interest earned:				
From Term deposits	5,130,770.00		3,383,408.00	
From SB accounts with nationalised banks	336,839.96		90,705.00	
From JNCASR Corpus Fund	2,340,889.00		1,506,671.00	
TOTAL	7,808,498.96		4,980,784.00	
Schedule 18-Other income:				
From Visitors house,Guest rooms etc	2,311,145.00		1,570,746.00	
CSIR Fellowships, SRFP reimbursement etc.,	9,553,246.00		8,122,118.00	
From others	639,331.00			0.00
TOTAL	12,503,722.00		9,692,864.00	

Sd/-
R.S. Gururaj
Accounts Officer

JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH

Schedule forming part of the accounts

Description	2006-07		2005-06	
	Rs.	Ps.	Rs.	Ps.
Schedule 20 Establishment Expenses				
Salaries & Scholarship to students	37,182,865.00		32,085,060.00	
Wages	5,695,703.00		5,307,061.00	
Allowances (Medical reimbursements etc.,)	1,583,149.00		1,212,997.00	
Bonus	142,880.00		150,487.00	
Contribution to CPF	1,150,397.00		2,031,352.00	
Other expenditure like honorarium etc.	0.00		174,046.00	
Contribution to Group Gratuity Scheme	190,000.00		3,251,816.00	
LTC	287,119.00		127,590.00	
TOTAL	46,232,113.00		44,340,409.00	
Schedule 21- Other Administrative expenses				
Electricity & Power	11,050,622.00		11,103,309.00	
Water charges	1,620,673.00		2,133,468.00	
Insurance	366,112.00		44,012.00	
Repairs & maintenance	6,037,299.00		5,129,800.00	
Rents,rates & taxes	1,226,289.00		471,001.00	
Vehicles running & maintenance	3,205,175.00		2,736,231.00	
Postage, telephone & communication	2,697,340.00		4,545,880.00	
Printing & stationery	2,491,310.00		2,091,526.00	
Travelling and conveyance	2,073,419.00		2,756,244.00	
Expneses on Seminars/workshops/discussion meetings	4,771,639.00		15,057,596.00	
Subscriptions	91,259.00		37,625.00	
Fees towards training etc.,	387,155.00		536,181.00	
Professional charges	4,730,086.00		1,773,360.00	
Canteen subsidy	0.00		626.00	
Laboratory Consumables	19,565,164.00		20,148,643.00	
Freight Inwards	2,301,375.00		0.00	
Other consumables	516,458.00		0.00	
Advertisement & Publicity	981,388.00		1,013,288.00	
Other miscellaneous expenses	865,454.00		802,024.00	
Auditors remuneration:				
Statutory Audit fee	22,448.00		22,448.00	
Internal Audit fee	56,120.00		0.00	
Student Research Fellowship Programme	245,253.00		1,423,868.00	
TOTAL	65,302,038.00		71,827,130.00	
Schedule 23- Interest and Bank charges :				
Bank charges & commission	39,036.00		0.00	
Schedule 25- Contingent Liabilities & Notes on Accounts:				
A.Contingent Liabilities :				
1. Claims against the entity not acknowledged as debts			Nil	
2. Letter of credit outstanding			69,46,305.00	
B.Estimated amount of contracts remaining to be executed on capital account and not provided for :				
a. In respect of Equipments	2,10,02,600.00			
b. In respect of Buildings	2,55,00,000.00			
Total	4,65,02,600.00			

Sd/-
R.S.Gururaj
 Accounts Officer



JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH

CPF FUND STATEMENT AS ON 31.03.2007

Particulars	Rs.	Ps.	Particulars	Rs.	Ps.
SUBSCRIPTIONS					
Opening Balance			Investments in :		
Add: TDS & expenses deducted in earlier years			Government of India 8 % Bonds (SHCIL)	12500000.00	
			State Government Securities (25 lakhs)	2640416.67	
Add: Subscriptions received during the year	2248999.00		Fixed Deposits at Canara Bank	6000000.00	
Loan repayments	674328.00		Fixed Deposit at HDFC	2000000.00	23140416.67
Interest on subscriptions	1060701.00				
			Closing Cash and Bank Balance :		
Less: Withdrawals on retirement/death	21524.00		Cash at Bank :		
Loans granted during the year	1839642.00		SB A/C No.17513		
			Canara Bank, IISc branch		1750599.10
Closing Balance - Subscription			Amounts recoverable :		
			TDS receivable for the year 2002-03	36122.00	
CONTRIBUTION			TDS receivable for the year 2003-04	22894.00	
Opening Balance			TDS receivable for the year 2004-05	41234.00	
Add: Contribution during the year	1150397.00		TDS receivable for the year 2005-06	8008.00	
Interest on total contributions	671065.00		TDS receivable for the year 2006-07	10140.00	118398.00
Excess amount paid in previous year adjusted during the year	209353.00		Expenses incurred :		
			Bank Charges 2004-05	749.00	
Less: Withdrawals on retirement/death			Bank Charges 2005-06	643.55	
Closing Balance - Contribution			Accrued interest on Deposits :		
			On Fixed deposits with Canara Bank	32762.00	
Total			Deficit		98384.23
			Total		25141952.55

This is the Receipts and payments account referred to in our report of even date.

for P.V.PRABHU & Co.,
Chartered Accountants

Sd/-
(Nagaraja)
Partner

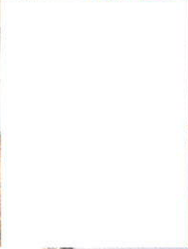
Membership no.205345

Place : Bangalore, Dated:17.09.2007

For Jawaharlal Nehru Centre for Advanced
Scientific Research

Sd/-
R.S.Gururaj
Accounts Officer

Sd/-
Prof.M.R.S.Rao
President





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