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Introduction

The Academy was founded in 1934 by Sir C V Raman with the main objective of promoting the progress and upholding the cause of science (both pure and applied). It was registered as a Society under the Societies Registration Act on 24 April 1934. The Academy commenced functioning with 65 Fellows and the formal inauguration took place on 31 July 1934 at the Indian Institute of Science, Bangalore. On the afternoon of that day its first general meeting of Fellows was held during which Sir C V Raman was elected its President and the draft constitution of the Academy was approved and adopted. The first issue of the Academy Proceedings was published in July 1934.

The present report covering the period from April 2010 to March 2011 represents the seventy-seventh year of the Academy.
There were two statutory meetings of the Council on 3 July and 10-11 December 2010.

3 Fellowship

3.1 2011 Elections

A total of 545 nominations received for fellowship in different disciplines were considered by the eight Sectional Committees and subsequently by the Council. Following postal balloting, 27 new Fellows were elected, the fellowship being effective from 1 January 2011. A list of their names follows, while Annexure 1 gives their particulars. Also elected were three new Honorary Fellows.

Fellows
1. Anand, Anuranjan
2. Arakeri, Jaywant H
3. Barman, S R
4. Bhatnagar, Rakesh
5. Chandrasekhar, S
6. Chattopadhyay, Samit
7. Chengalur, Jayaram Narayanan
8. Das, Amita
9. Gopidas, K R
10. Gopinath, C S
11. Gupta, Sourendu
12. Haritsa, Jayant R
13. Jayaraman, Narayanaswamy
14. Kang, Gagandeep
15. Minwalla, Shiraz
16. Raghavan, K N
17. Rajshekhar, Vedantam
18. Ranade, Vivek Vinayak
19. Rao, Madan
20. Roy, Rahul
21. Sengupta, Pulak
22. Shankar, D
23. Shivaji, S
24. Singh, Yogendra
25. Srivastava, Rajesh K
26. Tole, Shubha
27. Verma, Sandeep

Honorary Fellows
1. Friend, Richard H
2. Hartl, Daniel L
3. Marks, Tobin J

3.2 In memoriam

The Academy regrets to place on record the death of the following 19 Fellows and 1 Honorary Fellow during the period up to March 2011. Annexure 2 gives additional information about them.

Fellows
1. Adyalkar, P G
2. Alikunhi, K H
3. Gopala Rao, R V
4. Joshi, A B
5. Kapoor, L D
6. Laddha, G S
7. Mehta, M K
8. Nair, Balakrishnan N
9. Radhakrishnan, V
10. Rama Das, V S
11. Ramachandra, K
12. Ramakrishna, B S
13. Rao, D M
14. Rodrigues, Veronica F
15. Sethna, H N
16. Sirsat, S M
17. Surange, K R
18. Venkataraman, Balu
19. Venkataramani, K S

Honorary Fellow
Roy, Rustum

3.3 Strength of the Fellowship

<table>
<thead>
<tr>
<th></th>
<th>Fellows</th>
<th>Honorary Fellows</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 April 2010</td>
<td>971</td>
<td>49</td>
</tr>
<tr>
<td>Elected (Dec. 2010)</td>
<td>27</td>
<td>3</td>
</tr>
<tr>
<td>Deceased (2010 - 2011)</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>1 April 2011</td>
<td>979</td>
<td>51</td>
</tr>
</tbody>
</table>

3.4 Classification of nominations and Fellowship

Institution-wise classification of nominations for fellowship under consideration in 2011

Institution-wise classification of the Academy Fellows

A - Universities/Colleges
B - Academic Research Institutions (IITs, IISERs, IISc, TIFR, etc.)
C - Government Research Institutions (DAE, DBT, DoS, DRDO, etc.)
D - CSIR, ICAR, ICMR Institutions
E - Private Institutions
F - Fellows residing abroad
G - Fellows retired from institutions
Associates

Seventy three nominations were received and the following 17 were selected as Associates in 2010 (see also Annexure 3).

1. Ansumali, Santosh
2. Bhattacharyya, Suvendra Nath
3. Datta, Ayan
4. Datta, Ranjan
5. Dey, Abhishek
6. Ganapathy, Rajesh
7. Gun, Sanoli
8. Jain, Tanvi
9. Mukerjee, Subroto
10. Nair, Vijayakumar S
11. Nanda, Samik
12. Natarajan, Vijay
13. Patil, Nitin T
14. Ray, Partho Sarothi
15. Shankaranarayanan, S
16. Sripati, Arun P
17. Yadav, Gitanjali

Publications

5.1 Report on publications

The 5-year Co-publication Agreement with Springer for the 10 journals has been in effect during the year 2010 - 2011. From January 2011, a one-year ‘Internal Pre-Press Production’ Agreement is being implemented by which the typesetting and formatting of our journals are being done at SPi in Manila. After some initial practical problems, the implementation of this agreement is progressing reasonably satisfactorily. After review, its continuation beyond 2011 will be decided upon.

The numbers of full text downloads from all 10 journals on SpringerLink have continued to increase significantly. The figures for 2010 range from 88,222 for Bulletin of Materials Science to 54,344 for Journal of Chemical Sciences and 75,613 for Resonance - journal of science education.

As part of the collaboration with Springer, the final pdfs of accepted papers of all journals will be presented on Springer’s ‘Online First’. These pdfs will be identified with a DOI and an e-published date enabling these accepted papers to become fully citable even before these are compiled into a particular issue.

Some journals have also improved their impact factors, such as Journal of Biosciences (1.888), Journal of Genetics (1.338), Journal of Chemical Sciences (1.075) and Journal of Earth System Science (0.941).
5.2 Journals

The following 11 journals continue to be published by the Academy:

1. Bulletin of Materials Science
2. Current Science
3. Journal of Astrophysics and Astronomy
4. Journal of Biosciences
5. Journal of Chemical Sciences (formerly Proceedings Chemical Sciences)
7. Journal of Genetics
8. Pramana - Journal of Physics
9. Proceedings - Mathematical Sciences
10. Resonance - Journal of Science Education
11. Sadhana - Engineering Sciences

Journal-wise information on papers submitted for publication, the number of pages published and circulation figures of journals for the calendar year 2010 are given in Tables 1—3 (see pages 46—47).

5.3 Special issues of journals

Several journals brought out special issues of topical importance. A description of these follows:

Proceedings of the International Symposium on Nuclear Physics — Parts I and II

Guest Editors:
R K Choudhury,
A K Mohanty,
A Saxena,
K Mahata and
S Santra

Pramana, Vol. 75, Nos 1/2, July/August 2010,
pp. 1—392

This Symposium sponsored by the Board of Research in Nuclear Sciences, DAE, was held at the Bhabha Atomic Research Centre, Mumbai in December 2009. The year 2009 coincided with the birth centenary of Dr Homi Bhabha. Dr Bhabha was the pioneer of the nuclear energy programme in the country, and it was with his initiative that the annual DAE Nuclear Physics Symposium was started. The organizing committee decided to mark this occasion by making this symposium international. The aim of this series of symposia was to provide a scientific forum to the nuclear physics community to present their research work and to interact with the researchers in this area. There was a very enthusiastic response to the symposium in terms of the number of papers and theses submitted for presentation. There were invited talks by distinguished speakers from India and abroad which covered a wide range of topics from low to high energy nuclear physics, accelerator and detector facilities. This volume contains the papers of the invited talks. The proceedings of the symposium
published in two issues of *Pramana* contains 35 articles on nuclear physics.

**Organic and related solids**

Guest Editor: S Natarajan  
This special issue comprises the lectures delivered during the Indo-Russian Workshop on organic and 7 organo-metallic solids at Novosibirsk, Russia in September–October 2009. The workshop was supported by the Department of Science and Technology and the Russian Foundation for Basic Research (RFBR). The wide range of topics covered in this issue reflects the current trends in research in the area of organic and related solids.

**How is sex determined in insects?**

Guest Editors: J Nagaraju and Giuseppe Saccone  
Early observations that sex is associated with differences in chromosome constitution heralded the chromosomal theory of heredity. This year marks one hundred years since Thomas Hunt Morgan discovered a sex chromosome-linked mutation in *Drosophila melanogaster* which gave final proof to this theory. Morgan’s student Calvin Bridges formulated his classic balance theory of sex determination in *Drosophila* on the basis of genotypes with variable X:A ratios, implying a counting mechanism for X-linked female determinants and autosome-linked male determinants. Later it was found that single-gene mutations can affect not only specific traits but also the entire sexual fate of an individual. In 1944 another of Morgan’s students, Alfred Sturtevant, identified a recessive autosomal mutation in *D. melanogaster* that caused sex reversal of XX individuals into sterile males.

This recessive loss-of-function mutation, named *transformer (tra)*, did not have any effect in XY males, suggesting that the gene is required only in XX female flies. This was one of the first pieces of evidence that sex determination can be controlled by genes. Sturtevant also had an evolutionary perspective on the genomic control of sex determination. He had the foresight that the *intersex* mutation, previously described in the distantly related species *D. virilis*, corresponds to the *D. melanogaster tra* gene. Indeed, almost 50 years later a conserved *tra* orthologue was isolated in *D. virilis* which functionally corresponds to the previously described *D. virilis* intersex mutation. During the 1980s, molecular cloning and characterization of this and other *Drosophila* sex-determining genes revealed that the decision whether to become male or female is conveyed very early in embryonic development by a primary signal which is transmitted through a cascade of regulatory networks which ultimately results in the production of two distinct sexes.

Surprisingly, other species, belonging to different animal phyla, provide puzzling
examples of myriad sex-determining primary signals. The primary signal that provides the cue varies remarkably not only among taxa but also within taxa pointing to rapid evolution of sex-determining mechanisms. The insect order Insecta alone provides examples of astoundingly complex diversity of sex-determination mechanisms. In *Drosophila*, X-linked signal elements (XSEs) provide the signal to switch ON the top player of the sex-determination cascade, Sex-lethal (Sxl). This pathway consists of various regulatory genes that control not only the sex-determination cascade (Sex-lethal, Sxl; transformer, tra; transformer-2, tra-2), but also its maintenance (Sxl) as well as sexual differentiation (doublesex, dsx; fruitless, fru): XSE > Sxl > tra (+tra- 2) > dsx/fru. These genes produce sex-specific alternatively spliced mRNAs, and encode splicing regulators (Sxl, tra and tra-2) or transcription factors (dsx, fru).

As homologous molecular players involved in the cascade were beginning to be uncovered in other species, it was soon realized that the top layer of the pathway is not conserved outside *Drosophila* and thus a wider evolutionary perspective on sex determination started to emerge. Dipterans exhibit consistent differences in regulation of chromosomal/molecular players involved in the sex-determination hierarchy as reported for example in the Mediterranean fruitfly (*Ceratitis capitata*), housefly (*Musca domestica*), humpbacked fly (*Megaselia scalaris*), sheep blowfly (*Lucilia cuprina*) and *Sciara coprofila*. For example, XXY individuals are females in *D. melanogaster* because of the presence of two X chromosomes whereas in *C. capitata* XXY is male because of the presence of the Y chromosome. In *M. domestica*, the primary sex-determining loci vary in natural populations, and the presence of some of these loci convert autosomes to new sex chromosomes. A bizarre situation is encountered in *M. scalaris* where a low rate of transposition of male-determining factor from chromosome to chromosome creates a new sex chromosome each time it hops. Intriguingly, in *S. coprofila* elimination of the paternal derived chromosome occurs in a maternally controlled fashion. In the silkworm, *Bombyx mori*, a single W chromosome ensures female development even in the presence of triploid, tetraploid or hexaploid sets of autosomes and Z chromosomes, suggesting that the W chromosome harbours feminizing gene(s). At the next level of the sex-determination pathway, the well-studied RS protein-encoding gene transformer (tra) isolated in different dipteran species, offers an interesting example of partial conservation and functional divergence from *Drosophila*. Ever since the first discovery of its autoregulation in the Mediterranean fruitfly *C. capitata* (traep, tra epigenetic), similar tra autoregulatory loops have been shown to be operative in all insects from which functional tra genes have been characterized.

The rapid divergence of molecular players at the top of the hierarchy is also evident in hymenopterans. In honeybee *Apis mellifera*, the allelic status of complementary sex determining (CSD) locus, a tra^ep^ related gene, provides the initial cue. Bees heterozygous at the csd locus are females, whereas hemizygous or homozygous bees are males. The product of the csd gene sets up, during early embryogenesis, the initial activation or repression of feminizer (fem, equivalent of tra^ep^), by controlling alternative splicing of
latter’s pre-mRNAs. The *fem* gene is able to maintain its activated state throughout development by an autoregulatory loop. The parasitic wasp *Nasonia vitripennis*, however, does not have a csd locus. Instead, this insect depends on a combination of maternal supply of *tra* mRNA (another *tra<sup>op</sup>*-equivalent gene that shows structural, regulatory and functional homologies to *tra<sup>op</sup>* and a paternal genome set, to set up zygotic activity of *tra* through autoregulation of its own pre-mRNA splicing. In this species a novel way of *transformer* control in insect sex determination implies the action of maternal imprinting. In silkworm, attempts to discover the top molecular signals have remained elusive. All lines of evidence point to the presence of a female-determining gene on the W chromosome. Initial results suggest that this region codes for a set of zinc finger protein encoding genes but their mechanism of action has remained unclear. Interestingly, a gene encoding P-element somatic inhibitor (PSI) has been discovered recently but it is expressed in both sexes and abrogation of its function results in alteration in *doublesex* (*dsx*) splicing pattern. Contrary to the top signals, *dsx*, which functions at the bottom of the sex-determination cascade, is very well conserved in almost all the insects examined to date as also in other taxa as well, where it has been shown to be essential for male determination. Thus, insects provide vivid examples of an astonishing diversity of primary signals of sex determination that not only vary between species but even within species, in contrast to terminal genes which are conserved across taxa.

This special issue is dedicated to providing an update of the data available from genetic studies of sex determination and of sexual differentiation in a wide range of insect species.


Guest Editors:
L M Gantayet, K Dasgupta, Sunita Singh, B M Suri, D J Biswas, S Sinha and S Kundu

*Pramana*, Vol. 75, Nos 5 & 6, November & December 2010, 552 pages

These special issues have emerged out of papers and invited talks presented at the National Laser Symposium held at BARC in January, 2010. The year 2010 was the 50th year of laser, a cause for celebrations worldwide commemorating the invention of laser in 1960. It has therefore, been our special endeavour to substantially strengthen the scientific content of National Laser Symposium encouraging wider international and national participation of the scientific fraternity involved in the field of lasers and laser applications. Besides making the contents of the symposium available to a wider audience, these two special issues are also intended to serve as a reference for future research, which the symposium hopes to have stimulated.

The National Laser Symposium is an annual event sponsored by the Department of Atomic Energy, Board of Research in Nuclear Sciences. The symposium is organized in collaboration with Indian Laser Association and is held at different locations in India,
The ninth DAE-BRNS National Laser Symposium was held during January 2010, at Bhabha Atomic Research Centre, Mumbai. The symposium provides a dedicated platform for young researchers in laser physics and technology to interact with eminent scientists from India and abroad, and to present their latest work.

As in previous years, the National Laser Symposium covered frontline research in basic laser physics as well as significant advances in development and applications of laser technology. Srikumar Banerjee, Chairman, Atomic Energy Commission and Secretary, Department of Atomic Energy, Govt. of India, inaugurated the symposium. The keynote address at the symposium was delivered by Swapan Chattopadhyay, Sir John Cockroft Chair of Physics, Universities of Lancaster, Liverpool & Manchester, and Director, The Cockroft Institute, UK. The four-day symposium included 22 invited talks by leading experts and young researchers from India and abroad, 212 contributory papers presented as posters, and 10 oral thesis presentations. The papers were painstakingly peer-reviewed by a team of experts.

Proceedings of the National Conference on X-Ray Fluorescence

Guest Editors: Manoranjan Sarkar and Subinit Roy
Pramana, Vol. 76, No. 2, February 2011, 184 pages

Wilhelm Conrad Roentgen discovered the existence of X-rays in 1895 through the shadow cast by the unknown rays. The seed for the evolution of X-rays as a technique in the field of applied scientific research was sown that very day. In the late 1920s, a number of research workers, led by von Hevesy, clearly demonstrated the potential of X-ray spectroscopy for chemical analysis. Since then, slowly but steadily, X-ray spectroscopy has grown into an irreplaceable analytical tool with applications in diverse fields including material science, biological and medical sciences, archaeological, geological and environmental sciences.

In recent years, the development of powerful X-ray sources, advent of new generation detectors with sophisticated electronics and introduction of new techniques in X-ray focusing have ushered in a new era for X-ray fluorescence spectroscopy. It was beyond one’s imagination even a decade ago. Based on recent advancements, industries are also coming up with state-of-the-art XRF instruments to be utilized in various fields.

The National Conference held at the Saha Institute of Nuclear Physics, Kolkata in January 2010, was organized to present the latest developments in X-ray fluorescence and to stimulate fruitful discussions amongst researchers in our country.
The structure of the conference was based on invited talks, posters, short oral presentations and an interaction session. With three of the invited speakers from abroad, a panel was formed to judge the posters presented and to select four contributions for short oral presentations. During the interaction session, scientists from the Centre of Archaeological Studies and Training, Kolkata and the West Bengal Pollution Control Board highlighted the nature of synergy with the X-ray spectrometrists required to know what is critical for the problem they are working on. The proceedings consisted of thirteen invited talks and four refereed contributed papers.

The conference was organized by the erstwhile Nuclear and Atomic Physics Division of Saha Institute of Nuclear Physics, Kolkata with the active collaboration of Centre of Archaeological Studies and Training, Kolkata, UGC-DAE Consortium for Scientific Research, Kolkata and West Bengal Pollution Control Board.

For several years the idea of setting up a repository of all scientific publications of Academy Fellows (present as well as past) has been under discussion and consideration. The estimated numbers are, approximately, 1,580 Fellows (980 present and 600 past) and 75,000 publications. Such a repository would make available a valuable resource of scientific work in the country over the past century.

Phase I of this project was entrusted to Messrs. Informatics (India) Ltd. to be carried out during the period July 1 to December 31, 2010. At its completion the records in the Repository numbered as follows:

- Number of papers with only metadata is 30,000 of which the number of papers with metadata and full text is 8,142.

The total cost of completing Phase I amounted to Rs. 14.5 lakhs.

Work on Phase II has been underway since April 1, 2011.
7 Discussion Meetings

7.1 Microstructural evolution and phase transformation at different length scales

Orange County, Coorg
21 – 24 February 2010

Convener: K Chattopadhyay (IISc, Bangalore)

This discussion meeting on ‘Microstructural evolution and phase transformation at different length scales’ held at Orange County, Coorg was attended by 24 participants. The meeting on the 21 February began with a presentation by D. Banerjee (DRDO) on the importance of microtexture in controlling the microstructure of the titanium alloys and their subsequent properties followed by a presentation by Vikram Jayaram (IISc, Bangalore) on the nature of ductile glass in ceramic systems and the issue of co-existence of two glasses of different densities. Dey (BARC, Mumbai) spoke on the variety of metastable microstructures that form during the micropyretic synthesis.

On the 22 February, the first talk was by K Chattopadhyay (IISc, Bangalore) on issues related to the co-existence and transformations of multiscale features in multiphase microstructures. This was followed by a talk by M P Gururajan (IIT, Bombay) on the effects of misorientation and anisotropy on the grain growth in poly crystalline materials. S Lele (BHU, Varanasi) discussed the cluster expansion method (for configurational enthalpy of mixing) and cluster variation method (for configurational entropy of mixing) (CE-CVM) for calculation of the free energy of a materials system. N Ravishankar (IISc, Bangalore) discussed the role of interfaces in controlling various properties in advanced functional materials. Kallool Mondal’s (IIT, Kanpur) talk was on the thermo-dynamic modeling of nucleation of crystalline phase in glasses. Bhaskar Majumdar (DMRL, Hyderabad) discussed the microstructures of melt spun and annealed Fe-Si-B-Nb-Cu, Fe-Zr-B-Cu and Fe-Co-Zr-B-Cu alloys processed under different conditions and their corresponding soft magnetic properties. D. Prabhu’s presentation was on the effect of Cu clustering in engineering the microstructure of HITPERM type alloys with emphasis on using advanced technique like 3-dimensional atom probe tomography to understand the mechanism of crystallization in these materials. K. Biswas (IIT, Kanpur) spoke on issues related to the sintering of nanometric size particles followed by G. Phanikumar’s (IIT, Madras) talk which involved discussion on various issues related to microstructural evolution during rapid solidification using 9 melt spinning, solidification of undercooled melts using electromagnetic levitation and flux undercooling, solidification of weldments and alloy casting.

On the 23 February, the first talk was by B S Murthy (IIT, Madras) on the various issues related to the microstructural evolution in a driven system followed by the presentation on the evolution and characterization of structures of three phases of titanium alloys, namely martensitic, Ti3Al( 2) and B2 phases by A K Singh (DMRL, Hyderabad). D Santosh Hosmani (IIT, Delhi) discussed the issues related to the science of phase transformations at metal/gas interfaces followed by Debalay Chakrabarti (IIT, Kharagpur) spoke on the challenges in the
development of bimodal grain structures in low carbon steel. Anirudha Biswas (BARC, Mumbai) spoke on the various aspects of the application of atom probe tomography technique for characterization of materials. R Balamuralikrishnan (DMRL, Hyderabad) discussed the role of nanoscale characterization in identifying and optimizing avenues for microstructure control during processing towards realization of desired properties in engineering (an engineered) materials. The meeting concluded with the talk by Chandan Srivastava (IISc, Bangalore) on the particle size dependent microstructural evolution in isolated bi-metallic nanoparticles.

7.2 Molecular Interactions
Orange County, Coorg
28 November — 1 December 2010
Convenor: E Arunan (IISc, Bangalore)

The meeting started with a brief introduction given by Arunan, convenor of the meeting. He pointed out that there have been several key advances over the last decade that challenged the conventional wisdom about hydrogen bonding. The stunning difference between the crystal structure close to the freezing point at ambient conditions, for ice (H$_2$O) at 0°C and H$_2$S at -60°C has led to the common perception of 'hydrogen bonding' and 'van der Waals interaction' as two distinguishable physical forces among chemists. The advent of molecular beam spectroscopy and scattering studies have showed that (H$_2$O)$_2$ and (H$_2$S)$_2$ have similar structures. Moreover, molecular beam electric resonance spectroscopy showed that the complex formed between HF and ClF had a structure ClF• • •HF, rather than the expected hydrogen bonded ClF• • •HF. Though it was originally called 'anti-hydrogen bond' now it is well recognized as a halogen bonded complex. IUPAC recognized the importance of these phenomena and formed task groups to summarize our understanding of these phenomena and define hydrogen bonding and halogen bonding. Among the participants were E. Arunan and J. Sadlej (Chair and core-group member of the task group to define hydrogen bond) and
Judith Howard from University of Durham spoke in the second session and compared neutron and X-ray diffraction techniques to investigate molecular interactions. She pointed out that neutron diffraction is good for locating H atoms but X-ray diffraction can give electron density topology in the crystal which is crucial in understanding bonding. C Pulla Rao (IIT, Mumbai) spoke on manifestations of weak interactions in complex molecules. He discussed lectin-carbohydrate interaction and also Hg$^{2+}$• • • π interaction which results in fluorescence enhancement in anthracenyl-glyco derivatives.

Pierangelo Metrangolo, Politenico de Milano, spoke about halogen versus hydrogen bonding in crystal engineering. He showed that Br as acceptor could interact with partially positive Cl/Br/I in molecular complexes which are now described as halogen bonding but not F. After the talk, Guru Row mentioned that his group has looked at cases where the electron cloud in F could be distorted leading to a 'halogen bond' with F as the positive end.

G Mugesh (IISc) discussed the role of intermolecular interactions in the synthesis and recognition of thyroid hormones. He emphasized the role $\delta$Se• • • $\delta$I and $\delta$Se• • • $\delta$N interactions in these systems and showed their importance in the treatment of hyperthyroidism. Arunan spoke next about hydrogen, halogen and lithium bonding and presented microwave spectroscopic results on unusual complexes formed between benzene and ethylene and also methane and hydrogen sulphide. He also cautioned against the blind extension of the hydrogen bond definition proposed by the IUPAC task group chaired by him for defining the halogen bond. He particularly showed that X-F stretching frequency in Y• • • X-F halogen bond is not a
useful criterion for halogen bond as opposed to the H-F stretching frequency in Y•••H-F. Mrinalini Puranik (NCBS) spoke about aromatic amino acids and substrates as probes of local environment and dynamics in proteins. She highlighted the importance of dynamics in addition to the steady state structures in determining the protein functions and how simulation of Raman intensities can help in these studies. T N Guru Row (IISc) demystified the ‘pharmaceutical cocrystals’ and showed that there is no difference between cocrystals and salts. He also presented the crystal structure of adenine without water, characterized for the first time. He also summarized the extensive work his group has carried out on ‘halogen bonding’. G Krishnamoorthy (TIFR) talked about site-specific dynamics in an RNA thermometer. He showed that a single mismatch in base pairing can lead to significant differences in the fluorescence anisotropy lifetime.

David Capelletti from Perugia, Italy described how one can get intermolecular potentials from crossed beam experiments. Coupled with state-of-the-art theoretical methods, he showed that charge transfer plays an important role in weakly hydrogen-bonded complexes formed between rare gas and H$_2$O and also H$_2$ and H$_2$O. Sanjay Wategaonkar (TIFR) discussed experimental results obtained from his molecular beam laboratory using spectroscopic techniques. Through a comprehensive study he showed that sulphur atom can be as good an acceptor for hydrogen bonds as are F, O and N. He also showed that in many of these ‘hydrogen bonded systems’ dispersion plays a crucial role.

Joanna Sadlej from University of Warsaw showed how vibrational circular dichroism (VCD) spectroscopy can be useful in probing chirality transfer in molecular interactions. As the VCD intensity depends both on the electric and magnetic dipoles and particularly the angle between them, it offers a unique tool for studying intermolecular interactions. Hanudatta Atreya (IISc) convinced the participants about the importance of NMR in elucidating inter-domain interactions in proteins. He presented results from both NMR spectroscopy and molecular dynamics simulation. V Subramanian (CLRI) made the last presentation for the meeting. He discussed the interaction between peptides and carbon nanotubes investigated by classical dynamics simulation. He presented new results on adamentane-benzene interaction.

The last session was dedicated to discussing the IUPAC provisional recommendation on the definition of the hydrogen bond.

7.3 Operator theory and applications

Orange County, Coorg
23 – 26 February 2011

Convener: K B Sinha (JNCASR, Bangalore)

The topics covered in the lectures and discussions were: Random Schrödinger operator, estimates of eigengenerators of non-selfadjoint operators, Berg’s theorem and finite-dimensional approximation, holomorphic cocycles on fock space, Hilbert $C^*$- modules and disc-algebras.

There were seventeen participants including one each from UK and Germany and five young researchers.
presented many results (including his own) in the present theory that give internal evidence for and point in the direction of the proposed new interpretation. In a way this is a synthesis of Boltzmann’s and Einstein’s fundamental conceptual contributions. The entire idea found an echo in Rajesh Gopakumar’s presentation on ‘The journey from Maxwell to Faraday’ involving two somewhat earlier larger than life figures in the development of physics.

K N Ganesh’s special lecture on ‘Bioinspired chemistry’ highlighted recent work in going from an understanding of the basic nucleic acids DNA and RNA to novel therapeutic agents and assembly of nano materials. This work is linked to Pune as the name PNA – ‘Pune’ nucleic acids - implies or encodes, and is at the frontiers of research.

Shyam Benegal’s Public Lecture was a masterful account by an accomplished film maker of the inspirations behind Indian cinema over the decades. Titled ‘Communications and culture: Tradition, modernity and postmodernism in Indian cinema’, he described with humourous touches the standard formulas, stereotypic characterizations and the songs and dances that practically defined Bollywood films for a long time. As he said, this ‘art form’ has certainly become very popular in many parts of South Asia, and even beyond. He also described the Satyajit Ray phenomenon and its tremendous significance for Indian cinema.
For old-timers it was comforting to hear the speaker describe with appreciation the poetical content of the lyrics set to music in the semi-classical style, at least until some time ago, in our films. Cinema, as he pointed out, is recent, only 117 years old, and yet represents and defines entertainment in unique ways. It both ‘reflects as much as it influences society and culture’.

This MYM, the first after the series of Platinum Jubilee events of 2009, was as usual well attended and appreciated for its wide ranging scientific content.

The Seventy-Sixth Annual Meeting of the Academy was held during 12-14 November 2010, hosted and organized by the National Institute of Oceanography at Dona Paula in Goa. This was a return to this charming city a decade after the meeting in 2000 was held there. The attendance was particularly good, with over 250 Fellows and Associates (including spouses), and 28 teacher invitees present.

The opening address titled “Nanotube dynamo and graphene” by the President Ajay Kumar Sood described in a lucid and extremely well-illustrated manner the work in his laboratory on various properties of nano forms of carbon. This was very timely as the 2010 Nobel Prize in Physics awarded to Geim and Novoselov recognized their ‘ground breaking experiments regarding the two-dimensional material graphene’. In this context it was most interesting to remember that while coal, graphite and diamond have been known to mankind for millennia, the newer forms of this amazing chemical element – fullerenes, nano tubes and
graphene - have been discovered by humans only over the past few decades. The address described studies which can lead to a wide variety of possible applications - drug delivery, liquid flow-induced voltages, vibration sensors, inter-connects, and materials combining flexibility with amazing strength, to name just a few.

The programme included two special scientific lectures, two public lectures, two mini symposia and 18 presentations by newly elected Fellows and Associates. The public lectures were both of outstanding interest and quality. The first one by C Raja Mohan of The Indian Express, based in Delhi, titled “India and the Indian Ocean: In search of a strategic role” dwelt on the geopolitical importance of events in the Indian Ocean for the country. He pointed out that for many millennia the people in the subcontinent have always regarded land routes coming into the region - from the north west as well as north east - as the routes by which invaders could appear and threaten us. The realization that we are ‘open to invasion’ from the seas too is much more recent. Added to this is the fact that this ‘our’ ocean is ringed by failed or failing states. All this means that as a country we need to evolve newer ways of thinking and strategy to safeguard our security and future.

The second public lecture by Kaushik Basu, Chief Economic Adviser to the Government, was on “The Role of Higher Education in Economic Development”. This talk too was marked by a freshness and candour which matched the earlier one. The speaker emphasized the importance of science for the Indian ethos, and stressed that research was important for society going beyond economic value. Pure research needs support, applications come later. In the past couple of decades, since 1994, the Indian growth rate has been on the rise, and sharply so since 2005. From a foreign exchange reserve of 5 billion dollars in 1991, we are now at 350 billion dollars. There had been an overproduction of engineers since the 1950s, but this turned to an advantage in recent times, combined with global opportunities and the knowledge of English. However we have to also realize that our literacy is shockingly low. For growth in economy we must invest in education, particularly in higher education; the connection between the two is immense. Basu stressed that higher education in all fields — sciences, humanities,
economics — is important for us. Our Gross Enrolment Ratio, now at 12%, must increase; but most of our 460 odd universities are in a bad state. We need centres of excellence, the Government should support institutions in the basic fields, and leave the rest to private sources. There is need and space for both, we must bring the best to academics. The two mini-symposia were devoted respectively to “Indian estuaries” and “Stem cells in development and regeneration”. The former dwelt essentially on studies and phenomena in and around the west coast and the waters surrounding Goa, all seven speakers being from the host institution. The latter introduced the stem cell concept which is relatively recent, and its role and relevance in eye problems, brain development and psychiatry – an astonishing range!

A K Singhvi’s special lecture on “Synergistic mutualism between geology and physics: The case of luminescence” described studies over the past three decades in developing and using a new and reliable dating mechanism suitable for going back a few million years. The technique is based on thermal and optical-stimulated luminescence, and the accuracy is about 3% to 5%. Its uses in geology, human impacts over a million years, intervals between earthquakes, river floods and the like were described.

K V S Rao’s special lecture on “The dynamics of host-pathogen interactions in TB infection” dealt with new ideas and approaches to tackle the re-emerging scare and burden of tuberculosis. That the pathogens have co-evolved with humans and thus successfully survive in them leads to the difficulties of treatment. The speaker dwelt on new chemotherapeutic strategies that could disrupt the adaptive mechanisms which allow the pathogens to ‘live happily’ within the host, and in the progress, in experiments. Among the other presentations, the great contrast between K Subramanian’s account of magnetic fields at the galactic and extra galactic scales and Kalobaran Maiti’s description of puzzles in magnetism in ‘everyday’ materials was quite striking. Naba Mondal’s talk on ‘Neutrinos: A new window to the Universe’ dealt with ‘the most tiny quantity of reality ever imagined by a human being’, and with the ambitious Indian Neutrino Observatory, and T S S R K Rao’s mathematical talk titled ‘An invitation to the geometry of higher dual spaces’ left one wondering how a significant property could be seen up to the sixth duality operation, but not beyond. The meeting as a whole was very well organized and coordinated in all respects, with all events (except the dinner on the boat ride!) taking place on the campus of the host institution.
Huzihiro Araki, the Academy’s twenty-seventh Raman Professor was in India for about two weeks in July—September 2010 to take up the Chair. Araki is a Professor of Mathematics at the University of Kyoto, Japan. He was the first president of IAMP and drew up its statutes.

His outstanding achievements at the interface of physics and mathematics are exemplified by his work on the structure of the algebra of local observables and its representations, collision theory, the variational principle in statistical mechanics and the notion of relative entropy for infinite quantum systems. He was awarded the Henri Poincaré Prize 2003 for his lifetime contributions to the foundations of quantum field theory, quantum statistical mechanics and the theory of operator algebras.

Araki visited Hyderabad during August 2010 and took part in the International Mathematics Conference. He delivered an Academy public lecture on ‘Some contact points of mathematics and physics’ on 8 September 2010 in Bangalore.

Some Contact Points of Mathematics and Physics

H Araki (Raman Professor, Indian Academy of Sciences, 2010; Professor of Mathematics, University of Kyoto, Japan)
8 September 2010, Indian Institute of Science, Bangalore

Theoretical physics has been a constant source of motivation for new mathematical ideas and problems, as well as a good testing ground for mathematical methods. In return, mathematics has provided theoretical physics with convenient and powerful machinery. The theory of operator algebras is a newcomer in this inter-relation. It had very little contact with theoretical physics although its founders such as von Neumann and Segal had physical motivations for their works. The Baton Rouge Conference in March 1967, turned out to be an occasion for the unveiling of a new era. Powers, who was a physics graduate student, then presented a proof that a certain one-parameter family of von Neumann algebras (technically Type III factors) are mutually non-isomorphic, a startling result compared with the earlier state, where only three Type III factors were distinguished in 30 years. In mathematics, examples are usually destined...
to be absorbed in general theory. Two general theories which exerted a much greater influence were distributed as preprints at the Baton Rouge Conference. One was the paper by physicists, which proposed the celebrated KMS condition as the characterization of equilibrium states in quantum statistical mechanics. The other was a work by a pure mathematician. The participants were surprised to see exactly the same equations in these two papers, although they were written by authors who never knew each other. The talk explained how this happened and how this coincidence brought about a spectacular development both in mathematics and physics.

The challenges and opportunities of nanotechnology in China

Chunli Bai (Honorary Fellow, Indian Academy of Sciences; Executive Vice-President, Chinese Academy of Sciences, Beijing, China)
25 October 2010, Indian Institute of Science, Bangalore

His research areas involve the structure and properties of polymer catalysts, X-ray crystallography of organic compounds, molecular mechanics and EXAFS research on electro-conducting polymers. Prof. Bai, one of the pioneers in the field of scanning probe microscopy and nanotechnology in China, has been instrumental in furthering China’s nanoscience and nanotechnology research both as a scientist and a policy-maker. As chief scientist of the National Steering Committee for Nanoscience and Related Technology, he initiated and coordinated a number of national key projects about nano S&T. He is the Founding Director and Council Chairman of the National Centre for Nanoscience and Technology, China.

Dharmanand Kosambi: The life and contribution of a Buddhist sociopolitical thinker

Meera Kosambi (Former Professor and Director, Research Centre for Women’s Studies, S.N.D.T. Women’s University, Mumbai)
18 November 2010, National Institute of Advanced Studies, Bangalore

Dharmanand Kosambi (1876-1947) was a pioneering Buddhist scholar of Buddhism in India, whose quest for spiritual solace through Buddha’s doctrine had led him to monkhood for some years in Sri Lanka and Burma. But the most fascinating part of his life was his journey from the rural Goa of his birth to Harvard University, USA, as a visiting research scholar. Exposure to socialist ideology in the USA made a deep impact on him because he could relate it to the working of the Buddhist Sangha or monastic order. Also, his deep faith in Buddhism attracted him to Gandhiji’s freedom struggle based on truth and non-violence.
Chandra: Gentleman, scholar and telescope

Roger Blandford (Kavli Institute for Particle Astrophysics and Cosmology, Stanford, USA)

8 December 2010, Indian Institute of Science, Bangalore

Professor Subrahmanyan Chandrasekhar, or “Chandra” as he was widely known, was a singular scientist and intellectual. Blessed with formidable mathematical ability and legendary powers of concentration he was a scientific leader over an unequalled suite of the most challenging astrophysical disciplines. Although he may be most famous for his youthful discovery of a mass limit for white dwarfs and its famous corollary that black holes must exist, for which he was awarded the 1983 Nobel Prize, his lifetime contributions to mathematical physics, astrophysics and even the humanities, are even greater. The range and durability of his scholarship was memorialised in the naming of the finest imaging X-ray telescope ever launched. Vignettes from his life were interspersed with a description of some of the amazing discoveries made by Chandra X-ray Observatory.

Never reaching a stable steady state: Highly dynamic patterning mechanisms and their application to chemotaxis

Hans Meinhardt (Max Planck Institute for Developmental Biology, Tübingen, Germany)

1 February 2011, Indian Institute of Science, Bangalore

Spontaneous pattern formation in biology requires a local self-enhancing reaction that is antagonised by components that act on a longer range. Some patterns, for example pseudopod formation during chemotaxis and the pole-to-pole oscillation of MinD in E. coli, involve highly dynamic behaviour. They can be explained by assuming two antagonistic reactions, one with a long range (for spatial patterning) and one with a short range but a long time constant (for quenching local maxima soon after generation). Such a mechanism enables minute external asymmetries to be detected. Reactions of this type are also involved in many developmental processes including pigmentation patterns on shells of molluscs, barb formation in avian feathers and phyllotaxis in plants.

Evolution of physical chemistry

C N R Rao (Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore)

20 January 2011, Indian Institute of Science, Bangalore
12 Science Education Programmes

Since 2007, the three national Science Academies of the country have been conducting in a formal and well-structured manner a variety of programmes to improve science education for the benefit of students and teachers all over the country. These are planned and co-ordinated by a Joint Science Education Panel. The three main programmes of the Panel are: summer fellowships, refresher courses, and lecture workshops.

12.1 Summer fellowships
This is the fifth year of the Summer Research Fellowship Programme which is jointly conducted by the three National Science Academies of the country. The summer fellowship programme enables young and motivated students and teachers to do short-term projects for two months with Fellows and other scientists of the country. The main objective is to expose them to the joy of doing science. It was started in 1995 on a very small scale. The number of fellowships awarded in 1995 was 3. In 2010, this number has gone up to 1300 of which, the fellowships availed in 2010 was 1008. Table 4 gives the subjectwise break-up of applications received, fellowships offered and availed.

12.2 Refresher courses
This is an all-India programme to help motivated teachers improve their background knowledge and teaching skills. It is normally of two-week duration and teachers selected from all over the country undergo a rigorous course of lectures, discussions, laboratory experiments, and problem-solving sessions. During the last 12 years 90 courses have been held in several parts of the country on a variety of subjects: experimental and theoretical physics; experimental and theoretical chemistry; biotechnology; mathematics; atmospheric science; animal and plant tissue culture; experimental nonlinear dynamics; vistas in zoological teaching; marine geology and geophysics; tensors; phylogenetic biology; stochastic process etc. During the year 2010–2011, 17 Refresher Courses have been held, and a list of these courses with relevant details follows:

A. Refresher Courses in Experimental Physics
In 2010–11, 8 Refresher Courses were on Experimental Physics. These were held under the direction of R Srinivasan who was instrumental in conceiving and designing the experiments with the assistance of a group in Goa University. These experiments are useful for the laboratory programmes at BSc and MSc levels and many universities in the country have adopted these experiments as part of their curricula. In order to conduct the Refresher Courses, a user-friendly kit
containing several components has been developed and these are now being manufactured under licence by a company in Bangalore: M/s Ajay Sensors and Instruments.

In 2010, the Academy set up an experimental physics laboratory in Bangalore. It will now be possible to hold 4 to 6 courses in Bangalore besides courses that will be held in other parts of the country.

Some of the experiments that can be done with the kit are listed below:

1. Calibration of a silicon diode and a Cu-Constantan thermocouple against Pt 100 thermometer
2. Temperature coefficient of resistance of copper
3. Load regulation of the constant current source
4. High resistance by leakage
5. Stefan’s constant
6. Thermal and electrical conductivity of copper
7. Thermal diffusivity of brass
8. Law of addition of capacities, dielectric constant of benzene and dipole moment of acetone
9. Measurement of impedance of an inductance and capacitance as a function of frequency, series and parallel resonant circuits
10. Passive filters - low pass, high pass and band pass
11. AC Bridges (Maxwell’s, DeSauty’s and Anderson’s Bridges
12. Thermal relaxation of a serial light bulb
13. Study of the lock-in amplifier and its calibration
14. Measurement of mutual inductance with a lock-in-amplifier
15. Measurement of low resistance with a lock-in-amplifier

At every course, a series of lectures are held to help the participants in conducting the experiments and problem-solving sessions.

The following is a list of Experimental Physics Refresher Courses held since April 2010 with R Srinivasan as the Course Director. These form Course numbers XX to XXVII in this series.
1. (XX) Manipal Institute of Technology, Manipal
24 May — 9 June 2010

No. of participants: 20

Course Co-ordinator: Sripathi Punchithaya K (Manipal Institute of Technology)

Resource Persons: R Srinivasan (Mysore), SM Sadique, KR Priolkar (Goa University, Goa), Efrem D’Sa (Carmel College, Goa) and Manohar Naik (Goa).

Special lectures: Hydrogen: the source of future energy (Mangej Singh, University of Rajasthan), Human urine — a possible source of energy (Shrikanth Korkare, Raje Ramrao College, Sangli).

2. (XXI) Tumkur University, Tumkur
28 June — 12 July 2010

No. of participants: 26 from Chennai, Madhugiri, Tiptur, Tumkur, Turuvekere and Udupi.

Course Co-ordinator: R Ananda Kumari, (Sree Siddaganga College for Women, Tumkur)

Resource Persons: R Srinivasan (Mysore), R Ananda Kumari, Lakshminarayana and Thomas Francis (Sree Siddaganga College), SB Syamala (MG College, Thiruvananthapuram).

Special lectures: Smart material and smart memory alloys (US Mallikarjun), Image processing with video demonstration (KV Suresh).

3. (XXII) Bangalore University, Bangalore
15 — 31 July 2010

No. of participants: 16 from Chikkaballapur, Chennai and various colleges in Bangalore.

Course Co-ordinator: K Rukmani (Bangalore University)

Resource Persons: R Srinivasan (Mysore), K Rukmani, BN Meera, LCS Murthy, Sarbari Bhattacharya (all of Bangalore University), Rajini Ashrita (Osmania University College for Women, Hyderabad).

4. (XXIII) Shivaji University, Kolhapur
5 — 20 October 2010

No. of participants: 25 from Amaravati, Arjunnagar, Aundh, Baramati, Chandgad, Gagdhinglaj, Jabalpur, Karad, Kolhapur, Kurukali, Rayaguda, and Sangli.

Course Co-ordinator: CH Bhosale (Shivaji University)

Resource Persons: R Srinivasan (Mysore), JBC Efrem D’Sa (Carmel College for Women,
Goa), SM Sadiq and Manohar Naik (Goa), KRS Priolkar (Goa University), AK Sharma, CH Bhosale and KY Rajpure (all of Shivaji University).

5. (XXIV) Mahatma Gandhi University (MGU), Kottayam
18 November – 3 December 2010

No. of participants: 38 from Aluva, Chungathura, Ernakulam, Idukki, Kalady, Kolenchery, Kothamangalam, Kottayam, Melukavumattom, Pala, Parumala, Pathanamthitta, Ranny and Thiruvananthapuram.

Course Co-ordinator: C Sudarsanakumar (MGU)

Resource Persons: R Srinivasan (Mysore), Rajini Ashrita (Osmania University, Hyderabad), Syamala Thampi (MG College, Thiruvananthapuram) and A Gnanaprákash (University of Mysore).

Special lectures on current research topics by NV Unnikrishnan, C Sudarsanakumar and K Indulekha.

6. (XXV) IASc, Bangalore
15 – 31 December 2010

No. of participants: 25 from Adipur, Alipur, Bangalore, Bilaspur, Chennai, Chitradurga, Coimbatore, Hassan, Jalandhar, Kannur, Kothamangalam, Kottayam, Mukhed, Mysore, New Bombay, New Delhi, Ranchi, Talcher, Udupi.

Resource Persons: JBC Efrem D’Sa (Carmel College of Women, Goa), SM Sadiq and Manohar Naik (Goa), KRS Priolkar (Goa University, Goa), K Rukmani, BN Meera, Sarbari Bhattacharya (all of Bangalore University), SB Gudennavar (Christ University, Bangalore).

Special lectures: Discovery of superconductivity in ternary boro-carbides (R Nagarajan); soft condensed matter covering the behaviour of liquid crystals, polymers and colloids (VS Raghunathan); (HL Bhat) Development of lasers and their application; (TG Ramesh) Shape memory effect and thermoelectricity.

7. (XXVI) Ramakrishna Mission Vivekananda College, Chennai
18 January – 2 February 2011

Course Co-ordinator: E Kannan (Ramakrishna Mission Vivekananda College)

8. (XXVII) IASc, Bangalore
22 March – 6 April 2011

No. of participants: 27 from Bangalore, Chitradurga, Coimbatore, Dhenkanal, Guntakal, Guntur, Gurgaon, Hooghly, Kadapa, Ranchi, Talcher, Thalavady, Vadodara, Vidyanagar.

Resource Persons: R Srinivasan (Mysore), Sarbari Bhattacharya and K Rukmani (Bangalore University), SG Bubbly and SB Gudennavar (Christ University, Bangalore), Seeta Bharati (Bangalore), TG Ramesh (NAL, Bangalore).

Special lectures: Electron paramagnetic resonance (SV Bhat); laser cooling of atoms and liquid crystals (Hema Ramachandran and NV Madhusudana).
B. Other Refresher Courses:

9. Foundations of physics
Bengal Engineering and Science University (BESU), Shibpur, 17 — 27 May 2010

No. of participants: 46
Course Director: Amitabha Ghosh (BESU)
Course Co-ordinator: BK Guha (BESU)
Resource Persons: HS Mani (Chennai), AK Mazumdar, AK Mallik (SN Bose Centre for Basic Sciences, Kolkata), JK Bhattacharjee (IACS, Kolkata), BK Guha, Amitabha Ghosh (BESU).

The basic objective of the programme was to create interest in basic sciences in the minds of senior school students by bringing a selected group of such students in close contact with eminent academicians of the country. For the past couple of decades, the finest elements of the school students have been going for medical, engineering and administrative professions, neglecting the field of basic sciences. Technology and engineering have always grown in tandem with the growth of basic sciences. The edifice of most of the technologies is based on physics, chemistry and mathematics. This programme was aimed at attracting young minds to basic sciences and encourage them to take up a career that will promote the development of science in our country and thereby enrich the field of science throughout the globe.

The shortcoming of the present day school education system is that the students are supplied with ready made formulae and asked to solve problems without understanding how the formulae were developed, the difficulties the builders of science faced in developing a theory and how they could overcome them. This programme was intended to familiarize students to the process of development of physical theories and kindle interest in their minds for the world of physics.

The topics of lectures were designed to introduce concepts behind fundamental branches of physics developed through the last 350 years and provide a glimpse into the fascinating world of modern physics. It was felt that laboratory demonstrations of interesting experiments that illustrate the fundamental laws of physics would be essential for understanding the concepts. There were 36 lectures covering topics on Newtonian dynamics and gravitation, special theory of relativity, thermodynamics and statistical mechanics, electricity and magnetism, quantum mechanics and nonlinear dynamics.

Demonstrations and experiments included a falling sheet of paper; the role of air resistance, and how a parachute works; the ring magnets in repulsive mode and the free fall of the system; how a light ring connected with a string that passes over a peg drops down. Physics of rotational motion: role of critical observation and designing of experiment; movement of the fingers supporting a uniform ruler and the identification of the centre of mass; Archimedes principle loss of weight measurements of specific gravity of solids using a uniform beam and applying the principle of moments; Generation of sound and Doppler effect; Colours of the sky and stop traffic signal and the role played by scattering of light; different ways of breaking the ruler by bending; role of bending moment and the explanation for beam positions under the bridge or flyover; the jumping ball; the role of measuring device; measuring voltages across capacitors with a multimeter and balancing three knives.

There were special lectures by eminent scientists and academicians from premier research institutes of the city. Books on fundamentals of physics by Halliday, Resnick and Walker, Newtonian mechanics by AP French and 1-2-3 infinity by George Gamow were distributed to all the participants.
10. Motivational bridge course in mathematical methods in physics and laboratory practices

Dayanand Science College, Latur, 1 – 26 June 2010

No. of participants: 44

Course Director: S Ananthakrishnan (University of Pune)

Course Co-ordinators: LV Thakare and RH Ladda (Dayanand Science College, Latur)


The thrust of the bridge course was mainly for developing the analytical abilities of students while studying physics. The main theme was to make the students aware and get them involved in mathematical methods in physics; also to provide them laboratory excitement through simple open-ended experiments. The structure of this course was developed to bridge the gap between mathematical techniques applied to physics situations and the core physics taught at the UG level. It was proved that this course will become a very good motivation for the students to choose physics as the subject for their postgraduate course.

11. Frontiers in atmospheric sciences

Indian Institute of Tropical Meteorology (IITM), Pune, 14 – 25 June 2010

No. of participants: 22 from Bangalore, Bhopal, Hyderabad, Jadhavpur, Kurud, Kurukshetra, Mangalore, Pune, Ranchi, Roorkee, Sawyerpuram, Tirunelveli, Varanasi, Vizag.

Course Directors: AK Kamra and BN Goswami (IITM)

Course Co-ordinator: V Gopalakrishnan (IITM)

Resource Persons: S Gadgil (IISc, Bangalore), G Pandithurai, R Krishnan, GB Pant, AK Kamra, BN Goswami, G Beig, JR Kulkarni, K Krishankumar and S Chakraborty (IITM, Pune).

The course pedagogy included a combination of lectures and laboratory and field visits. There were a minimum of three lectures everyday on various topics of contemporary interest in atmospheric sciences. Laboratory visits aimed at giving practical exposure to participants on the latest techniques adopted in the measurements of different atmospheric parameters. The participants visited various laboratories of IITM and IMD, Pune and were taught about the working of various state-of-art equipment, data handling and analysis.

Field trip to wind power generation near Satara was arranged. The participants were given a book on “Atmosphere, weather and climate” by Roger G Berry and Richard J Chorley.
12. Contemporary non-equilibrium thermodynamics and statistical mechanics

RTM Nagpur University, Nagpur, 20 October — 2 November 2010

No. of participants: 31 teachers from Chandigarh, Dehradun, Goa, Gondia, Hassan, Karaikal, Kolkata, Mohali, Mouda, Mumbai, Nagpur, New Delhi, Ratnagiri, Vijayawada, Wardha.

Course Director: DS Ray (IACS, Kolkata)
Course Co-ordinators: Anil A Bhalekar and LJ Paliwal (RTM Nagpur University)

Resource Persons: David Jou (Autonomous University of Barcelona, Bellaterra, Spain), Ingo Müller (Technical University, Berlin), RS Johal (IISER, Mohali), BL Tembe (IIT, Mumbai), Sunil Nath (IIT, Delhi), C Dasgupta (IISc, Bangalore), D Chowdhury (IIT, Kanpur), MV Sangaranarayanan (IIT, Chennai), R Venkatesh (BHU, Varanasi), PM Gade and AA Bhalekar (RTMNU, Nagpur) and SS Dhondge (SKP College, Nagpur).

This course focussed on nonequilibrium thermodynamics and statistical mechanics. Nonequilibrium thermodynamics comprised of extended irreversible thermodynamics, rational thermodynamics, classical irreversible thermodynamics, foundations of nonequilibrium thermodynamics, electrochemical processes, quantum heat engines and finitetime thermodynamics.

The statistical mechanical topic comprised of Bayesian statistical kinetic theory of non-uniform systems, Chandrasekhar equation in chemical dynamics, ordered disordered systems, percolation problems of dilute magnetic systems, spin glasses, structural glasses, random field systems, stochastic kinetics and enzymology, stochastic of molecular motors, nonequilibrium statistical mechanics of liquids and dynamics of phase transitions in spatially extended systems.

The participants were given books on ‘Elements of nonequilibrium statistical mechanics’ by Balakrishnan and ‘Statistical mechanics’ by K Huang. The participants were also taken for a half day excursion tour to Ramtek.

13. Recent advances in chemical science and its technological applications

Sikkim Manipal Institute of Technology (SMIT), Sikkim, 8 — 21 December 2010

No. of participants: 27

Course Director: MK Chaudhuri (Tezpur University, Tezpur)
Course Co-ordinator: Amlan Kumar Das (SMIT)

Resource Persons: Ghanashyam Bez, RK Poddar (NEHU, Shillong), BC Ranu, Subrata Ghosh (IACS, Kolkata), Arun Chattopadhyaya (IIT, Guwahati), SC Bhattacharyya, Kaushik Das, Pratik Sen, Chittaranjan Sinha and BC Roy (Jadavpur University), A Anil Bhalekar (RTM Nagpur University), N Homendra (Manipur University), Sanjib Bagchi (IISER, Kolkata), A Chatterjee (Himalayan Pharmacy Institute, Sikkim), Anirban Misra (North Bengal University) and Sanjay Dahal (SMIT).

Topics covered: The course covered all important topics in chemistry such as thermodynamics, electrodechemistry, surface chemistry, Green chemistry, nanochemistry, photochemistry, spectroscopy, quantum chemistry, chemical kinetics and catalysis, supramolecular chemistry, bioinorganic chemistry, polymer and colloid chemistry, organic reaction mechanism, symmetry, group theory and applications.

The teacher participants were from Adipur, Bhopal, Chennai, Deoghar, Dhanbad, Gangtok, Hyderabad, Jharkhand, Kolkata, Madurai, New Delhi, Pudukkottai, Ranchi, Sikkim, Sonitpur, Thalassery, and Thiruvananthapuram.
14. Foundations of mathematics

Bengal Engineering and Science University (BESU), Shibpur, 27 — 31 December, 2010

No. of participants: 38

Course Director: Amitabha Ghosh (BESU)

Course Co-ordinator: Bichitra Kumar Guha (BESU)

Resource Persons: JK Bhattacharya (SN Bose National Centre for Basic Sciences, Kolkata), Ashok Kumar Majlick, BK Guha, Basudeb Mukhopadhyay, Tapan Kumar Roy and Murari Mitra (BESU).

Mathematics is supposed to be the mother of all sciences. It forms the basic tool and language of physical sciences. Unfortunately in the regular school curriculum students are taught only a set of formulae and are asked to solve problems on the basis of these formulae. The approach followed in the schools does not create interest in the subject. The present course was aimed at complementing the school curriculum with historical development of mathematical ideas and their practical applications to the world of modern physical sciences.

There were twenty-two lectures and three special lectures on rough set, fuzzy set and set theory by M Chakrabarty, differential equations and their applications by J Das and scaling theory by Amitabha Ghosh.

Topics of lectures: Maxima and minima; Fermat’s principle; brachistochrone’s problem; iteration on integers; real numbers; complex numbers and nonlinear dynamics; geometry in the context of theory of relativity; matrices and their applications; theory of numbers and fuzzy set; theory of probability and its applications.

A book on “What is mathematics?” by Richard Courant and Herbert Robbins (Oxford University Press) was presented to all the participants.

15. Modern biotechnological techniques

Manipal University, Manipal, 10 — 22 January 2011

No. of participants: 19

Course Director: V Nagaraja (IISc, Bangalore)

Course Co-ordinator: K Satyamoorthy (Manipal University)

Resource Persons: V Nagaraja, KP Gopinathan, Umesh Varshney, K Somasundaram, P Konidhar (IISc, Bangalore), Kempara, PM Gopinath, Murali, Padmalatha Rai, Saadi Abdul Vahab (MLSC, Manipal), Shree Dhwale (Purdue University, Indiana), LS Shashidhara (IISER, Pune), Girish Katta (Kasturba Medical College, Manipal).

Topics of lectures: Genomic diversity and evolution; mind, body and soul; protein-DNA and protein-protein interactions; restriction endonucleases; topoisomerases; transcription activation and termination; cytogenetics and its various applications in biotechnology; expression systems; for recombinant DNA cloning; synthetic life: diagnosis of bacterial cell cultures; stem cells and cloning; behavioural adaptations and evolution; PCR techniques, applications of classical genetics in modern biology; regulatory RNA; human genetic diseases; cancer diagnostics; DNA sequencing; microarrays and applications: breast and brain cancers.

The teacher participants represented institutions from Aizawl, Bangalore, Burdwan, Coimbatore, Gulbarga, Hyderabad, Indore, Jhunjhunu, Mahe, Malappuram, Mangalagangothri, Manipal, Moodbidri, Narsapur, Pune, Thanjavur.
16. Condensed matter and statistical physics
St Thomas College, Pala, 28 February — 13 March 2011

No. of participants: 27 from Kanyakumari, Karaikal, Kasargod, Kottayam, New Delhi, Pala, Pune, Srirakulam, Visianagaram, Wayanad.

Course Directors: Srikanth Sastry (JNCASR, Bangalore), G Baskaran (IMSc, Chennai)

Course Co-ordinator: Ison V Vanchipurackal, (St Thomas College)

Resource Persons: G Baskaran, R Shankar, Gautam Menon (all of IMSc, Chennai), Srikanth Sastry (JNCASR, Bangalore), Subodh Shenoy (University of Hyderabad, Hyderabad), V Venkataraman, Vijay Shenoy (IISc, Bangalore).

Topics of lectures: Quantum mechanics; statistical mechanics; phase transitions; biological matter; solid state physics; optoelectronics and device physics; superconductivity.

17. Advances in biotechnology
National Institute for Research in Reproductive Health (NIRRH), Mumbai, 1 — 11 March 2011

No. of participants: 19

Course Director: Tarala Nandedkar (NIRRH)

Course Co-ordinator: Srabani Mukherjee (NIRRH)


Topics of Lectures/demonstrations and experiments: Secrets of biology as revealed through molecular biology; chemistry in health care Indian scenario; genomic DNA extraction agarose; animal model to access carcinogenesis of drug; PCR technology; DNA sequencing; epigenetic; blotting of biomolecules; RNA silencing; RNA extraction real time PCR; ELISA; RNA interference; proteomics; SDS-PAGE and immunohistochemistry; pluripotent stem cell; 2D gel electrophoresis; western blotting; cancer cytogenetic, microtubules cytogenetics and FISH; electron microscopy; characterization and purification of recombinant therapeutic proteins; protein purification techniques; chromatography and amino acid analysis facility; applications of flow cytometry; cell cycle analysis flow cytometry; HLA and disease susceptibility; cloning; cell signaling and cancer; how the brain is built; bioinformatics.
12.3 Lecture Workshops

The Joint Science Academy Panel arranges two or three-day lecture workshops on carefully chosen topics in physics, mathematics, chemistry and life sciences at selected college and university departments for the benefit of local students and teachers. Speakers include Fellows and scientists from nearby institutions. Since inception, 206 Workshops have been held. During the year up to 31 March 2011, 47 Workshops were held on various topics at different institutions in the country. The following gives some information on the Lecture Workshops held from April 2010 to March 2011.

1. Current trends in organic synthesis
Bangalore University, Bangalore, 9 – 10 April 2010
Convener: S Chandrasekaran (IISc, Bangalore)
Co-ordinators: VV Suresh Babu (Bangalore University)
Speakers: S Chandrasekaran, KR Prasad, N Jayaraman, AG Samuelson (IISc, Bangalore), J Narasimha Moorthy (IIT, Kanpur), HV Thulasiram (NCL, Pune), H Ila (JNCASR, Bangalore), DB Ramachary (University of Hyderabad)
Participants: 300 postgraduate students and faculty from colleges in Bangalore
Topics covered: Vinylcyclopropane and vinylcyclobutane derivatives; organic oxidations with IBX and organocatalysis with proline; carbohydrate chemistry; domino reaction in organic synthesis; total synthesis of natural
products of therapeutic importance: the Chiron approach; determining reaction mechanisms in organometallic reactions; exploitation of nature’s catalysts in organic synthesis; multi-catalysis cascade approach to the pharmaceuticals.

2. Protein: Structure, function and dynamics
Maharani Lakshmi Ammanni College for Women (MLACW), Bangalore, 9 – 10 April 2010
Convener: V Nagaraja (IISc, Bangalore)
Co-ordinator: MB Nagaveni (MLACW)
Speakers: JB Udgaonkar, MK Mathew (NCBS, Bangalore), Raghavan Varadarajan, Utpal Tatu, MRN Murthy, P Balaram, B Gopal, V Nagaraja, DN Rao (IISc, Bangalore)
Participants: 250 students and faculty from various colleges of Bangalore University
Topics covered: Dynamics of protein folding; protein stability and engineering; the amazing things that proteins do; proteomics; elucidation of biomolecular structure; G N Ramachandran and the evolution of protein structures; structure-function relationships in proteins; enzymes; enzyme catalysis and kinetics; protein-protein and protein-nucleic acid interactions.

3. Nanosciences and nanotechnologies
Don Bosco Institute of Technology (DBIT), Bangalore, 28 – 30 April 2010
Convener: Umesh V Waghmare (JNCASR, Bangalore)
Co-ordinator: HS Puttanna (DBIT)
Speakers: G Sundararajan (ARCI, Hyderabad), BS Sathyanarayana (RVCE, Bangalore), T Pradeep (IIT-M Chennai), Sharath Ananthmurthy (Bangalore University), GU Kulkarni, M Eswarmoorthy, N Chandrabhas, UV Waghmare (JNCASR, Bangalore), Murali Sastry (Tata Chemicals, Pune), SB Krupanidhi (IISc, Bangalore), MS Hegde, Harish Barshilia (NAL, Bangalore), Murali Kota (IBM, Bangalore)
Participants: 99 from colleges/institutions in Bangalore
Topics covered: Introduction to nano; technologies based on nanomaterials; policy and funding opportunities in nanotechnology; room temperature grown nanocarbons using cathodic arc process; why nanomaterials are interesting; light on cells, polymers and bacteria; nanolithography; nano-materials for catalysts and biological applications; nano-superlattices of multifunctional oxides; transition metal nitride-based nanostructured hard and superhard coatings; Raman spectroscopy as a nano-biotechnology tool.

4. Genomics and proteomics
Sri Padmavathi Mahila Visvavidyalayam (SPMVV), Tirupati, 17 – 18 August 2010
Convener: HS Savithri (IISc, Bangalore)
Co-ordinator: DM Mamatha (SPMVV)
Speakers: HS Savithri, MRN Murthy, PN Rangarajan, Utpal Tatu (IISc, Bangalore), W Rajendra (SV University, Tirupati)
Participants: 103 students and faculty from SV University & SPMVV, Tirupati
Topics covered: Genomics; computational analysis and structural biology; protein purification; gene expression and gene therapy; proteomics.

5. Microbes: Health and Disease
Mount Carmel College (MCC), Bangalore, 18 – 19 August 2010
Convener: MS Shaila (IISc, Bangalore)
Co-ordinator: HS Padma and Shubha Prakash (MCC)
Speakers: Udaykumar Ranga, Hemalatha Balaram (JNCASR, Bangalore), Sandhya S Visweswariah, Dipshikha Chakravorty, Saumitra Das, MS Shaila (IISc, Bangalore)
Participants: 200 students and faculty from University and colleges in Bangalore
Topics covered: Bacterial enterotoxins; how do microbes determine shape?; lessons from the failure of HIV vaccine clinical trials; novel antiviral strategies against human pathogens; conventional versus reverse vaccinology; unique features of metabolism in the malarial parasite Plasmodium falciparum.

6. Advances in materials research
Poornaprajna Institute of Scientific Research (PPISR), Bidar, 25 – 27 August 2010
Convener: KJ Rao (IISc, Bangalore)
Co-ordinator: AB Halgeri (PPISR)
Speakers: S Chandrasekaran, S Asokan, KJ Rao, AK Shukla, S Umapathy, S Ramakrishnan, N Suryaprakash, TN Guru Row, SA Shivashankar (IISc, Bangalore), BK Sadashiva (RRI, Bangalore), AB Halgeri, Satyanarayana (PPISR)
Participants: 88 faculty from various engineering colleges in and around Bangalore, Kuvempu and Mangalore Universities.
Topics covered: Materials and Green chemistry; phase changes in glasses and their applications; current advances in ceramics; molecular shape and liquid crystallinity; building better batteries; vibrational structural studies of materials to biology; novel catalytic materials; chiral discrimination by NMR spectroscopy; hyperbranched polymers—novel nano dimensional scaffolds; structure determination of complex inorganic oxides; nanomaterials from metal organic complexes; biodegradable materials—an overview.

7. Organic chemistry – Explore 2010
Christ University, Bangalore, 27 – 28 August 2010
Convener: Uday Maitra (IISc, Bangalore)
Co-ordinators: SJ Hepziba, Riya Datta (Christ University)
Speakers: Uday Maitra, S Ramakrishnan, Santanu Mukherjee, S Chandrasekaran (IISc, Bangalore), S Sankararaman (IIT, Madras)
Participants: 140 students and faculty from Christ University and colleges in Bangalore
Topics covered: Stereochemistry and conformation; basic principles of chromatography; amine, enamine, iminium and ammonium; hyperbranched polymers—pericyclic reactions; organic photochemistry; greening the chemistry curriculum.

8. Genetic transformation and transgenic plants: Concepts, applications and concerns
VIT University (VITU), Vellore, 7 – 9 September 2010
Convener: Uma Shaanker (GKVK, Bangalore)
Co-ordinator: R Siva (VITU)
Speakers: K Veluthambi (Madurai Kamaraj University), M Parani (SRM University, Chennai), I Kategiri (UAS, Dharwad), Nataraj Karaba, Rama Narasimhan, Uma Shaanker (UAS, Bangalore), R Siva (VITU)
Participants: 297 students and faculty from VITU and other institutions
Topics covered: Crown gall; plant based production of biopharmaceuticals; genetic modification; restriction digestion experiments; functional genomics; gene manipulation in plants; concerns about GM crops.

9. Some topics in biophysics
University of Mysore, Mysore, 16 – 17 September 2010
Convener: R Srinivasan (Mysore)
Co-ordinator: L Paramesh (University of Mysore)
Speakers: Pramod Pullarkat (RRI, Bangalore), Shachi Gosavi, Sanjay Sane, Satyajit Mayor (NCBS, Bangalore), Gautam Menon (IMSc, Chennai)
Participants: 100 students and faculty from University and colleges in Mysore
Topics covered: Protein folding; how insects fly; intracellular communication and transport; mechanical response of cells and their shape instabilities; physical methods in biology.

10. Recent molecular biological trends in infectious diseases and cancer
St. Joseph’s College, Bangalore, 24 – 25 September 2010
Convener: V Ravi (NIMHANS, Bangalore)
Co-ordinator: VJ Jacob Paul and S Rajamani (St. Joseph’s College)
Speakers: V Ravi (NIMHANS), Sudhir Krishna (NCBS, Bangalore), Ravi Kumar, Latha Lakshman (Xcyton Diagnostics, Bangalore), Annapoorni Rangarajan, P Ajit Kumar, Paturu Kondiah (IISc, Bangalore), RS Jayashree (Kidwai Memorial Institute of Oncology, Bangalore)
Participants: 220 participants from colleges of Bangalore and Vellore
Topics covered: Real time PCR in viral infection diagnosis; genomic sequences and cancer stem cells in human leukemias; diagnosis of infectious diseases; cancer stem cells; recent trends in cancer biomarker discovery; detection of antibiotic resistance using molecular diagnostic tools; principles of genetic engineering and their applications; intratumoral immune response in cervical cancers.

11. Modern biology
Aurora College, Hyderabad, 28 – 29 September 2010
Convener: Shekhar C Mande (CDFD, Hyderabad)
Speakers: Sanjeev Kholsa, MS Reddy (CDFD, Hyderabad), Sharmistha Banerjee (University of Hyderabad), Tapan K Kundu (JNCASR, Bangalore), DP Kasbekar (CCMB, Hyderabad), Sharmila Mande (TCS, Hyderabad), V Nagaraja (IISc, Bangalore)
Participants: 200 students and faculty from colleges and universities in Hyderabad.
**Topics covered:** Reprogramming of genetic information; tuberculosis; genes and cancer; shy study neurospora; metagenomics.

**12. Biodiversity biome - the web of life**
MGM Institute of Health Sciences, Navi Mumbai, 6 – 7 October 2010
**Convener:** Tarala Nandedkar (NIRRH, Mumbai)
**Co-ordinator:** DS Joshi (MGM Institute of Research)
**Speakers:** RD Lele (Lilavati Hospital, Mumbai); PB Seshagiri (IISc, Bangalore) SK Apte (BARC, Mumbai); SD Kholkute (NIRRH, Mumbai); J Bellare (IIT, Mumbai); Rajani Bhisey (University of Pune)
**Participants:** 350 students and teachers
**Topics covered:** Diversity in human disease/disorder; comparative biology and biodiversity in blastocyst development and implantation in mammals; microbial bioremediation; plant biodiversity in Western Ghats; macro-micro- and nano-technology; diversity in cancer genetics.

**13. Advances in chemistry**
PSGR Krishnamma College for Women (PSGRKCW), Coimbatore, 7 – 8 October 2010
**Convener:** R Ramaraj (MKU, Madurai)
**Co-ordinator:** A Shamitha Begum (PSGRKCW)
**Speakers:** D Ramaiah (NIIST, Thiruvanathapuram); G Mugesh, S Natarajan (IISc, Bangalore); C Namasiyam (Bharathiar University, Coimbatore); AK Mishra (IIT, Chennai).
**Participants:** 290 students and faculty from colleges in Coimbatore
**Topics covered:** Photodynamic therapy; heme proteins; bio and medicinal inorganic chemistry; activated carbons from agricultural solid wastes and removal of organics and inorganics from water; principles and applications of X-ray diffraction technique; polymorphism in solids and fluorescence.

**14. Recent trends in physics**
Lady Doak College, Madurai, 11 – 13 October 2010
**Convener:** M Lakshmanan (Bharathidasan University, Tiruchirappalli)
**Co-ordinator:** BJM Rajkumar (Lady Doak College)
**Speakers:** M Lakshmanan (Bharathidasan University), K Iyakutti (MKU), K Jeganathan (Centre for Nano-Science and Nano-Technology, Trichy), Sibasish Ghosh (IMSc, Chennai), VPN Nampoori (CUSAT, Cochin), K Murali (Anna University, Chennai), KPN Murthy (University of Hyderabad), CS Sundar (IGCAR, Kalpakkam)
**Participants:** 120 students and faculty from colleges in and around Madurai
**Topics covered:** Basic concepts of nonlinear dynamics; properties and applications of carbon nanotubes; semiconductor 1D nanowires and its applications; quantum computation and quantum algorithms; laser and its applications; nonlinear electronics: applications of chaos; the fundamentals of thermodynamics; three facets of materials research.

**15. Probing electronic states in molecules and molecular materials**
Marathwada University, Aurangabad, 21 – 25 October 2010
**Convener:** S Ramasesha (IISc, Bangalore)
**Co-ordinator:** Ramarao Mane (Marathwada University)
**Speakers:** S Ramasesha, PK Das, Satish Patil (IISc, Bangalore), KL Narasimhan (TIFR, Mumbai)
**Participants:** 170 students and faculty in colleges and university in Marathwada
**Topics covered:** Introduction to molecular materials; molecular devices; probing electron states; organic electronics; laser spectroscopy; electron states in molecules; electron states in solids; nonlinear optics; electron states in polymers.

**16. Animal behaviour**
IISER, Kolkata, 30 – 31 October 2010
**Convener:** R Gadagkar (IISc, Bangalore)
**Co-ordinator:** Anindita Bhadra (IISER, Kolkata)
**Speakers:** R Gadagkar (IISc, Bangalore), Mewa Singh (Mysore University), Annagiri Sumana, Anuradha Bhat, Punyasloke Bhaduri, Anindita Bhadra (IISER), VK Sharma (JNCASR, Bangalore), Suhel Quader (NCBS, Bangalore)
**Participants:** 148 students and faculty in IISER and Kolkata colleges
**Topics covered:** Why are humans nice to each other?; animal behaviour and wildlife management; colony emigration as influenced by key individuals: case study of an Indian ant; variations in behavioural responses to environmental manipulation in zebra fish populations; nocturnal sex drive in Drosophila; marine phytoplankton diversity - what do functional genes tell us?; coevolutionary conflict:
strategies and counter-strategies of brood parasites and their hosts; a study on urban feral dogs.

17. Vistas of science
Aurora College, Hyderabad, 26 — 27 November 2010
Convener: S Chaturvedi (University of Hyderabad)
Co-ordinator: Savitha Ramesh (Aurora College)
Speakers: Rajaram Nityananda (NCRA, Pune), Ghanashyam Krishna, KPN Murthy, V Kannan (University of Hyderabad), ALN Murthy (ISI, Hyderabad), Srinathan Kannan (IIIT, Hyderabad).
Participants: 275 students and faculty in Aurora and other colleges in Hyderabad
Topics covered: Astronomy with radio waves; nanoscience; thermodynamics; fractional dimensions; statistics and its relevance to society; cryptography and network security.

18. Spectroscopy
NIT, Tiruchirappalli, 3 — 4 December 2010
Convener: S Umapathy (IISc, Bangalore)
Co-ordinator: R Karvembu (NIT)
Speakers: S Umapathy, Uday Maitra, E Arunan, S Ramakrishnan (IISc, Bangalore), R Ramaraj (MKU) and A Sreekanth (NIT, Tiruchirappalli).
Participants: 200 students and faculty from NIT and other colleges in Tiruchirappalli
Topics covered: Electronic absorption spectroscopy; fluorescence spectroscopy; rotational spectroscopy; basics of nuclear magnetic resonance spectroscopy and its applications; Raman spectroscopy; NMR spectroscopy; spectroelectrochemistry; ESR spectroscopy.

19. Differential equations: Theory, methods and applications
Pondicherry University, Puducherry, 16 — 18 December 2010
Convener: KM Tamizhmani (Pondicherry University)
Co-ordinator: Rajeswari Seshadri (Pondicherry University)
Speakers: A Chakrabarti (IISc, Bangalore), S Kandaswamy (Bharathiar University, Coimbatore), M Vanninathan (TIFR-CAM, Bangalore), M Lakshmanan (Bharathidasan University), KM Tamizhmani, Rajeswari Seshadri (Pondicherry University).
Participants: 150 students and faculty from university and colleges in Pondicherry
Topics covered: Singular integral equations; perturbation techniques; basics of differential equations, superposition principle, linear and nonlinear equations, partial differential equations; basics of PDE and methods of solutions for solving PDE, homogenization and practical applications in industry.

20. Some topics in functional analysis and several complex variables
St. Josephs College, Irinjalakuda, 4 — 6 January 2011
Convener: S Thangavelu (IISc, Bangalore)
Co-ordinator: NR Mangalambal (St. Josephs College)
Speakers: K Narayanan, S Thangavelu, K Verma, G Bharali (IISc, Bangalore)
Participants: 81 students and faculty from St. Josephs and other colleges in Karnataka and Kerala
Topics covered: Topological vector spaces and theory of distributions; analyticity, holomorphicity, Cauchy integral formula and related properties; Fourier transform theory.

21. Interdisciplinary physics - some basic aspects
Ramananda College, Bishnupur, 6 — 7 January 2011
Conveners: Indrani Bose (Bose Institute, Kolkata) and BK Chakrabarti (SINP, Kolkata)
Co-ordinator: Goutam Biswas (Ramananda College)
Speakers: JK Bhattacharjee (SN Bose Centre, Kolkata), Soumitra Sengupta, DS Ray (IACS, Kolkata), BK Chakrabarti (SINP, Kolkata), Indrani Bose (Bose Institute, Kolkata), Arghya Taraphder (IIT, Kharagpur)
Participants: 86 students and faculty from various colleges in Bankura
Topics covered: Statistical physics; quantum physics; nonlinear dynamics; econophysics; biological physics; physics of nanomaterials.

22. Cognitive neuroscience and interdisciplinary approach to understanding behaviour
Sophia College, Mumbai, 10 — 11 January 2011
Convener: Vijayalakshmi Ravindranath (IISc, Bangalore)
Co-ordinator: Hema Ramachandran (Sophia College)
Speakers: Aditya Murthy (IISc, Bangalore), Anindya Sinha (NIAS, Bangalore), N Srinivasan, Bhoomika Kar (CBCS, Allahabad), R Manchanda (IIT, Mumbai)
Participants: 140 students and teachers from various colleges in Mumbai
Topics covered: Cognitive neuroscience of sensory motor control; an introduction to EEG and ERP; analysis of EEG and design of ERP experiments; functional MRI; obtaining computational insights into neuronal biophysics; social cognition in primates.

23. Protein engineering and its applications
Gitam University, Visakhapatnam, 20 — 21 January 2011
Convener: Shekhar C Mande (CDFD, Hyderabad)
Co-ordinator: M Anitha (Gitam University)
Speakers: Shekhar C Mande (CDFD), TM Radhakrishnan (Andhra University, Visakhapatnam), Sharmistha Banerjee (University of Hyderabad), R Sankaranarayanan (CCMB, Hyderabad), T Srinivasan, S Talluri (Gitam University)
Participants: 260 students from various colleges in Visakhapatnam
Topics covered: Networks in biology: interface of physics and biology; protein (enzyme) engineering; tuberculosis; evolution of virulence properties from common folds in pathogenic bacteria; protein engineering in plants; protein engineering and thermal stability.

24. Advances in biological sciences
Poornaprajna Institute of Scientific Research (PPISR), Bidar, 20 — 22 January 2011
Convener: AJ Rao (IISc, Bangalore)
Co-ordinator: AB Halgeri (PPISR)
Speakers: G Padmanaban, P Kondaiah, MRN Murthy, Utpal Tatu, R Annapoorni, Rajan Dighe, Dipshika Chakravarthy, AJ Rao (IISc, Bangalore), MRS Rao (JNCASR, Bangalore), NJ Shetty, VVS Suryanarayana (IVRI, Bangalore), KR Sridhar (Mangalore University), Jayaram Bhat (Goa University), NS Raviraja (Stempeutics, Manipal)
Participants: 50 students and faculty from colleges in Bangalore
Topics covered: Recombinant products; new direction in research in cell biology; biomarkers for cancer diagnosis; significance of unstructured proteins in viral survival; conventional approach to proteomics; clonal theory of cancer, recombinant proteins; genetic control of mosquitoes; problems of developing suitable and ideal vaccines; endophytic fungi in various plants; infectious diseases; metabolites from filamentous fungi; production of mesenchymal stem cells and their therapeutic application; need for population control.

25. Exploring recent horizons in chemical sciences
Marathwada University, Osmanabad, 21 — 22 January 2011
Convener: Anunay Samanta (University of Hyderabad)
Co-ordinator: SD Delekar (Marathwada University, Osmanabad)
Speakers: S Vasudevan (IISc, Bangalore), Anunay Samanta, SK Das, TP Radhakrishnan, MJ Swamy (University of Hyderabad), NP Argade, BLV Prasad (NCL, Pune)
Participants: 200 students and teachers from various colleges of Marathwada University
Topics covered: Intercalation in layered solids; shortlived species; polyoxometallates; sol-to-gel transformation in dispersions of layered solids; co-ordination chemistry of dithiolene and ortho-phenylenediammine ligands; importance of nanotechnology; polymer thin films with in situ generated metal nanoparticles; biomembranes; monodispersity, superlattices; nanomachining.

26. Frontiers in physics
Deen Dayal Upadhyaya College (DDUC), New Delhi, 21 — 23 January 2011
Convener: Manoj Saxena (DDUC)
Speakers: Ajoy Ghatak, Anurag Sharma (IIT, Delhi), Patrick Das Gupta, Sanjay Jain, D Choudhury, N Panchapakesan (University of Delhi), R Ramaswamy, Debashis Ghoshal, Sanjay Puri (JNU, New Delhi), Sudhendu Rai Chowdhury (IISER, Bhopal), SM Roy (TIFR, Mumbai)
Participants: 314 students and faculty from various colleges in Delhi
Topics covered: Measurements in quantum theory: EPR paradox and Bell's inequality; accelerating universe; repulsive gravity and dark energy; nonlinear science; instabilities in string theory; the origin of life problem: some mathematical insights; fundamental particles and interactions; large hadron collider; quantum
27. Foundation of analysis in mathematics
Indian Institute of Science Education and Research, Thiruvananthapuram, 21 – 23 January 2011
Convener: Mythily Ramaswamy (TIFR-CAM, Bangalore)
Co-ordinators: MP Rajan and Utpal Manna (IISER, Thiruvananthapuram)
Speakers: EK Narayanan (IISc, Bangalore), MP Rajan, Utpal Manna, R Prakash (IISER, Thiruvananthapuram), KSS Moosath (NIIST, Thiruvananthapuram), Mythily Ramaswamy, K Sandeep (TIFR-CAM)
Participants: 39 students from IISER and other colleges in Thiruvananthapuram
Topics covered: Single variable calculus; fourier series, linear algebra; multivariable calculus; integration in R^n; volume and surface integrals.

28. Mathematics
St. Joseph’s College, Bangalore, 28 – 29 January 2011
Convener: Mythily Ramaswamy (TIFR-CAM, Bangalore)
Co-ordinator: Renee D’Souza (St. Joseph’s College)
Speakers: Mythily Ramaswamy, K Sandeep (TIFR-CAM), Sujatha Ramdorai (TIFR, Mumbai), Alladi Sitaram, Kaushal Verma (IISc, Bangalore)
Participants: 70 students and teachers from various colleges in Bangalore
Topics covered: An introduction to real analysis; prime numbers; Fourier series; some examples in multivariat calculus; interplay between linear algebra and analysis.

29. Genes, genomics and proteomics
St. Aloysius College, Mangalore, 28 – 29 January 2011
Convener: V Nagaraja (IISc, Bangalore)
Co-ordinator: Avila D’Silva (St. Aloysius College)
Speakers: Umesh Varshney, Saumitra Das, Usha Vijayraghavan, Utpal Tatu, V Nagaraja (IISc)
Participants: 250 students and faculty from 11 colleges in and around Mangalore
Topics covered: Primordial germ cells and spermatogonial stem cells; the genographic and the migration of Man-40 and genomic technologies of genographic-40; aging; biology and behaviour of bats, cancer proteomics; novel regulatory network controlling transcription in E. coli; selectable marker elimination in transgenic rice, structural biology of porins of salmonella.

27. Foundation of analysis in mathematics
Indian Institute of Science Education and Research, Thiruvananthapuram, 21 – 23 January 2011
Convener: Mythily Ramaswamy (TIFR-CAM, Bangalore)
Co-ordinators: MP Rajan and Utpal Manna (IISER, Thiruvananthapuram)
Speakers: EK Narayanan (IISc, Bangalore), MP Rajan, Utpal Manna, R Prakash (IISER, Thiruvananthapuram), KSS Moosath (NIIST, Thiruvananthapuram), Mythily Ramaswamy, K Sandeep (TIFR-CAM)
Participants: 39 students from IISER and other colleges in Thiruvananthapuram
Topics covered: Single variable calculus; fourier series, linear algebra; multivariable calculus; integration in R^n; volume and surface integrals.
32. Modern trends in chemistry
Lady Doak College, Madurai, 7 — 8 February 2011
Convener: M Periasamy (University of Hyderabad)
Co-ordinator: S Vasantha (Lady Doak College)
Speakers: M Periasamy (University of Hyderabad), KR Prasad, AG Samuelson, S Chandrasekaran, S Natarajan (IISc, Bangalore), S Sankararaman (IIT Chennai)
Participants: 120 post-graduate students and teachers from various colleges and universities in Madurai
Topics covered: Stereochemical concepts in organic reaction mechanisms and synthesis; recent advances in organic synthesis; reaction mechanisms in organometallic chemistry; organotitanium reagents for use in synthesis of bioactive and energy harvesting molecules; weak interactions in inorganic chemistry; click chemistry and beyond; organic reactions “in water, on water and in the presence of water”; principles and applications of X-ray diffraction; pericyclic reactions; metal-mediated C-C coupling reactions.

33. Current trends in biology
MES College, Bangalore, 9 — 10 February 2011
Convener: HA Ranganath (NAAC, Bangalore)
Co-ordinator: Ravindra Reshme (MES College)
Speakers: R Gadagkar, V Nagaraja, Usha Vijayraghavan (IISc, Bangalore), KN Ganeshaiah, VS Acharya, Amitabh Joshi (JNCASR, Bangalore), Mewa Singh (University of Mysore), HA Ranganath (NAAC, Bangalore)
Participants: 170 students and faculty from MES and other colleges in Bangalore
Topics covered: Are insects smart?; metagenomics - a fascinating new area in biology; insect plant interactions and evolution of mutualism; experimental evolution; making of flowering stem; doing science and having fun; epigenetics.

34. Recent developments in physics
Govt. Arts College, Melur, 3 — 4 March 2011
Convener: M Lakshmanan (Bharathidasan University, Tiruchirappalli)
Co-ordinator: A John Peter (Govt. Arts College)
Speakers: J Sethuraman (Kirupananda Vairiyar Engineering College, Salem), M Lakshmanan (Bharathidasan University), G Baskaran (IMSc, Chennai), CS Shastry (Amrita University, Coimbatore), M Mangalraj (Bharathiar University, Coimbatore), V Yegnaraman (CECRI, Karaikudi)
Participants: 89 students and faculty from colleges in Melur
Topics covered: Nonlinear dynamics; superconductivity: lab view software; analytical s-matrix approach to study alpha decay of super heavy elements; development of nanostructured materials; electrochemical sensor, ultramicroelectrodes and microarrays, chemically modified electrodes – polymer-nano-composites as modifiers microfluidics; lab-on-a-chip EC detection of biomolecules.

35. Partial differential equations
IIT, Patna, 3 — 5 March 2011
Convener: Phoolan Prasad (IISc, Bangalore)
Co-ordinator: AK Upadhyay (IIT, Patna)
Speakers: D Bahuguna, MK Kadalbajoo, V Raghavendra (IIT, Kanpur), Phoolan Prasad (IISc, Bangalore)
Participants: 93 students and faculty from colleges and universities in Patna
Topics covered: Classification of second order PDEs; pure IVP for the wave equation of one dimension; IBVP for wave equation of one dimension; non-homogeneous wave equation; wave equation in a rectangular domain; wave equation in a circular domain; heat equation; Laplace’s equation; first-order linear, quasilinear and nonlinear partial differential equations; theoretical aspects of Laplace, wave and heat equations.

36. Emerging trends in digital image processing
GR Damodaran College of Science (GRDCS), Coimbatore, 4 — 5 March 2011
Convener: BB Chaudhuri (ISI, Kolkata)
Co-ordinator: S Umamaheswari (GRDCS)
Speakers: PK Yalvarthy (IISc, Bangalore), PVSSR Chandra Mouli (VIT, Vellore), P Nagabhushan (Bangalore Technological Institute), BL Deekshatulu (University of Hyderabad), T Senthilkumar (Amrita School of Engineering, Coimbatore)
Participants: 108 students and faculty from colleges in Coimbatore
Topics covered: Medical imaging; image segmentation and edge detection; futuristic research issues in image processing and vision computing; content-based image retrieval; application of genetic concepts in matlab for
image processing; research and model development issues in video processing.

37. Advances in molecular spectroscopy
SNGS College, Pattambi, 4 — 5 March 2011
Convener: K George Thomas (IISER, Thiruvananthapuram)
Co-ordinator: P Venugopalan (SNGS College, Pattambi)
Speakers: KL Sebastian (IISc, Bangalore), RS Swathi, Vinesh Vijayan, KM Sureshan, K George Thomas, Mahesh Harirhan, Reji Varghese (IISER), Suresh Das (NIIST, Thiruvananthapuram)
Participants: 253 students and faculty from SNGS and other colleges
Topics covered: Quantum mechanics; molecular spectroscopy; nuclear magnetic spectroscopy in biochemistry; biological applications of solid state NMR; is the boundary between chemistry and biology disappearing?; stimuli responsive materials; light-matter interactions in the nanoscale; structure of natural and non-natural DNA; DNA nanotechnology.

38. Forests as carbon sinks
University of Agricultural Sciences (UAS), Bangalore, 9 — 11 March 2011
Convener: KN Ganeshaiah (UAS)
Co-ordinator: AS Devakumar (UAS)
Speakers: NH Ravindranath, R Sukumar and Renee Borges (IISc, Bangalore), James Jacob (Rubber Research Institute of India), MK Yadav (PRL, Ahmedabad), MD Behra (IIT, Kharagpur), KN Ganeshaiah (UAS), KC Jha, BR Ramesh, M Sanjappa (Howrah), GS Pujar, Rajesh Gunaga, BN Satish, YB Srinivasa, ARV Kumar, Sridhar Vijayakrishnan, Padma Venkat (FRLHT), Amit Agarwal (Natural Remedies Ltd), BS Vishwanath (Mysore University), K Santhosh Kumar (RCGB), Ramesh, Prashant Patil, GM Devgiri (College of Forestry, Ponnampet), DK Ved, R Vasudeva, Ravi Prasad Rao, Uma Partap
Participants: 134 students and faculty from various colleges in Bangalore
Topics covered: Pollination and food security; mapping bio-rich areas of the country; diversity of Indian legumes; forest landscape analysis for biodiversity conservation; regional scale contiguity of vegetation; satellite remote sensing based assessment using IRS P6 data; floristic composition and conservation value of Brahmagiri wildlife sanctuary; tropical dry forests in ecological services in India; anthropogenic pressures affecting elephant habitat utilization patterns and foraging behaviour in Jaccanari reserve forests; ethno-pharmacology and bioprospecting in India; snake venom and calotropis; peptidal antibiotics from frogs; uncertainties in forest carbon assessment; carbon estimation using field inventory; aerospace data and geographic information system in Yamunagar district; estimation of AGB and carbon using remote sensing and geographic information system in South Western parts of Karnataka; species recovery programmes in India; conservation of cycads; pollinators in mountain ecosystems.

39. Graduate engineering curriculum development for biomass related subjects
IISc, Bangalore and Jain University, Bangalore, 10 — 11 March 2011
Convener: HS Mukunda (IISc, Bangalore)
Co-ordinator: CS Bhaskar Dixit (Jain University)
Speakers: HS Mukunda, S Dasappa, PJ Paul, NKS. Rajan (IISc, Bangalore), Bhaskar Dixit (Jain University)
Participants: 19 students and faculty from various engineering colleges in Bangalore
Topics covered: Introduction to bio-energy; biomass combustion devices; combustion/engine aspects/new research; carbon foot prints: CDM, JU.

40. Approaches to biodiversity conservation and utilization — North-East example
Regional Centre of Institute of Bioresources and Sustainable Development, Gangtok, Sikkim, 14 — 15 March 2011
Convener: J Nagaraju (CDFD, Hyderabad)
Co-ordinator: NC Talukdar (Institute of Bioresources and Sustainable Development, Imphal)
Speakers: M Sanjappa (Howrah), BG Unni (NEIST, Jorhat), JP Tamang, NC Talukdar (IBSD, Imphal), Usha Lachungpa (Sikkim), Syamali Chakrabarti (National Research Centre for Orchids, Pakyong).
Participants: 118 students and faculty from Sikkim University.
Topics covered: Conservation and utilization of biodiversity; biodiversity and bioresources of Sikkim Himalayas; molecular diversity of non-nulberry silkworms; diversity of the fermented foods and beverages in Sikkim; rich diversity of
flora, fauna and orchids of Sikkim Himalayas; role of IBSD in conservation and sustainable use of rich bioresources in North-East region of India.

41. Contemporary biology
Jain University, Bangalore, 15 — 16 March 2011
Convener: Sandhya S Visweswariah (IISc, Bangalore)
Co-ordinator: Vijayalakshmi Pradeep (Jain University)
Speakers: Renee Borges, Arun Sripati, Deepak K Saini, Dipshika Chakravorty, Arun Kumar, PB Seshagiri, Nagasuma Chandra (IISc, Bangalore)
Participants: 125 students and faculty from various institutions in Bangalore
Topics covered: Nothing in biology makes sense; looking into the brain; looking into cells; infection biology; introduction to human molecular genetics; recent advances in stem cells; bioinformatics.

42. Advances in chemistry
PSN College of Engineering and Technology, Melathediyyoor, Tirunelveli, 17 — 18 March 2011
Convener: R Ramaraj (Madurai Kamaraj University)
Co-ordinator: S Balakumar (PSN College)
Speakers: S Umapathy, E Arunan, S Natarajan (IISc, Bangalore), Anunay Samanta (University of Hyderabad), S Muthusamy (Bharathidasan University, Tiruchirappalli)
Participants: 229 postgraduate students and faculty from various colleges in Tirunelveli
Topics covered: Fluorescence signalling of transition metal ions; fluorescence probing of ionic liquids; laser spectroscopy and X-ray diffractions; laser spectroscopy; molecular beam microwave spectroscopy; hydrogen bonding; studies on cyclo additions; synthesis of macrocyclic compounds.

43. Brainwave: Inspiring young minds
SGTB Khalsa College, New Delhi, 17 — 18 March 2011
Convener: J Nagaraju (CDFD, Hyderabad)
Co-ordinator: Komal Kamra (SGTB Khalsa College)
Speakers: Akhilesh Tyagi (NIPGR, New Delhi), Anil Aggrawal (Maulana Azad Medical College, New Delhi), OP Jasuja (Punjabi University, Patiala), Balram Bhargava (AIIMS, New Delhi), S Natesh (DBT, New Delhi), Ram Ramaswamy (JNU, New Delhi), KN Ganeshaiah (UAS, Bangalore), J Nagaraju (CDFD), Navin Khanna (ICGEB, New Delhi), HY Mohan Ram, SD Biju (University of Delhi)
Participants: 700 students and faculty from various colleges in Delhi
Topics covered: Plant genomics; current perspectives in forensic biotechnology; biometrics; health care innovation in India; biotechnology in India; plants in Indian tradition; a few things that physics can learn from biology; mining the past for shaping the future; silk - key to evolutionary success of silkmoths and spiders; dengue vaccine; life: understanding with uncertain knowledge - halting human-induced amphibian extinction.

44. Prospects and future challenges in plant biotechnology
GR Damodaran College of Science (GRDCS), Coimbatore, 18 — 19 March 2011
Convener: K Veluthambi (MKU, Madurai)
Co-ordinators: A Malarvizhi/K Pavithra (GR Damodaran College)
Speakers: K Veluthambi, R Usha, (MKU), M Ramesh (Alagappa University, Karaikudi), R Jayanthi (Sugarcane Breeding Institute, Coimbatore), AS Raghavendra (University of Hyderabad), PR Padma (Avinashilingam University for Women, Coimbatore), N Tuteja (ICGEB, New Delhi), HS Savithri (IISc, Bangalore), R Uma Shaanker (UAS, Bangalore)
Participants: 141 students and faculty from GRD College and other institutions in Coimbatore
Topics covered: Generation of selectable marker-free, transgene stacked rice plants with sheath blight resistance; applications of plant virus research in biotechnology; ex situ conservation of bacopa monnieri (L) through biotechnological approaches; biotechnological approaches in pest management; C4 photosynthesis: recent advances in C3 plants; anticancer drugs in plants; MCM6 single subunit from pea functions as DNA helicase and promotes salinity stress tolerance without affecting yield; viruses as nano particles; bioprospecting in the Western Ghats.
45. Recent trends in physics
Amrita School of Arts and Sciences, Amrita Vishwa Vidyapeetham (AVV), Kollam, 23 — 25 March 2011
Convener: M Lakshmanan (Bharathidasan University, Tiruchirappalli)
Co-ordinator: VM Nandakumaran (AVV, Kollam)
Speakers: M Lakshmanan (Bharathidasan University), ES Raja Gopal (IISc, Bangalore), KA Suresh (Centre for Soft Matter Research, Bangalore), VPN Nampoori, MR Anantharaman (CUSAT), Anil Shaji (IISER, Thiruvananthapuram), VM Nandakumaran (AVV, Kollam)
Participants: 103 postgraduate students from AVV and nearby colleges
Topics covered: Nonlinear dynamics; liquid crystals; nonlinear optics; quantum computing; nanoscience and nanotechnology; measurement techniques; Bose-Einstein condensation of photons.

46. Statistical applications in industry, business, agriculture and ecology
St. Thomas College, Pala, 26 — 28 March 2011
Convener: AP Gore (Pune)
Co-ordinator: KM Kurian (St. Thomas College)
Speakers: Vijay Nair (University of Michigan, USA), AP Gore, TV Ramanathan, (Pune), EV Gijo (ISI, Bangalore), KK Jose (St. Thomas College), N Balakrishna (CUSAT, Cochin)
Participants: 103 students and faculty from St. Thomas College and other institutions in Kottayam
Topics covered: Statistics in industry; tiger and elephant counting; measurement of biodiversity using cycle sampling; statistics and information-intensive agriculture; process improvement using design of experiments and Taguchi methods; applications of forecasting in business and industry; six-sigma implementation in Indian industry.

47. Recent advances in biology
Manipur University, Imphal, 28 — 29 March 2011
Convener: K Muniyappa (IISc, Bangalore)
Co-ordinators: Upendra Nongthomba (IISc, Bangalore), DS Ningthoujam (Manipur University)
Speakers: K Muniyappa, Upendra Nongthomba, Deepak Saini, Rajan Dighe (IISc, Bangalore), DS Ningthoujam (Manipur University), Chitra Mandal (IICB, Kolkata)
Participants: 119 students and faculty from Manipur University and other institutions in Imphal
Topics covered: Genomics of microbial pathogens and discovery of new antimicrobial agents; role of ubiquitination in muscle disease and function; actinomycetes: treasure trove of bioactive secondary metabolites; exploration of Indian potential herbal sources for future new drugs; telomere and telomerase: their implications in human health and disease; sugar plays mysterious role in diagnosis and therapy of leukemia patients; living cells under the microscope; expression, characterization and purification of recombinant proteins; actinobacteria; revisiting signalling paradigms in living cells; glycoprotein hormone-receptor interactions; model organisms and drug discovery.

12.4 Participation of teachers in Academy meetings
The Academy maintains a database of bright and motivated teachers around the country largely based on recommendations received from the Fellows of the Academy. This list is constantly updated and contains names of teachers mainly from colleges and university departments in different disciplines. A few of these teachers are invited to the Academy mid-year and annual meetings every year to give them an opportunity to attend scientific lectures and to meet and interact with Fellows. About 54 teachers attended the Academy meetings in Bangalore and Goa. Over the past decade, about 950 teachers attended the Academy meetings.
13 Academy Finances

The accounts for the financial year 2010-11 were audited by a firm of chartered accountants. A summary of the income and expenditure for 2010-2011 is given below:

<table>
<thead>
<tr>
<th>Income</th>
<th>Plan/Non Plan Rupees (in lakhs)</th>
<th>Expenditure</th>
<th>Plan/Non Plan Rupees (in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant - DST</td>
<td>618.00</td>
<td>Journal printing</td>
<td>211.27</td>
</tr>
<tr>
<td>INSA/NASI</td>
<td>183.33</td>
<td>(including <em>Current Science</em>)</td>
<td></td>
</tr>
<tr>
<td>Subscriptions</td>
<td>72.53</td>
<td>Science education programmes</td>
<td>275.00</td>
</tr>
<tr>
<td>Others</td>
<td>94.30</td>
<td>Construction of additional floor</td>
<td>20.44</td>
</tr>
<tr>
<td>Deficit</td>
<td>0.02</td>
<td>Salaries</td>
<td>184.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Annual/mid-year meetings</td>
<td>49.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Postage</td>
<td>27.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others (maintenance of building, equipment, special publications, pension fund, modernization, etc.)</td>
<td>165.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surplus</td>
<td>35.21</td>
</tr>
<tr>
<td></td>
<td>968.18</td>
<td></td>
<td>968.18</td>
</tr>
</tbody>
</table>

14 Acknowledgements

The Academy’s publication activities are largely due to the voluntary and unpaid services of Editors, Members of Editorial Boards and the large number of reviewers who examine and comment on manuscripts sent to them for opinion. Several Fellows also contributed their services to other Academy activities such as organizing annual meetings and discussion meetings and conducting programmes on science education, etc. The generous financial assistance by the Department of Science and Technology has greatly contributed to the success of the activities undertaken by the Academy.
### Table 1

Information on papers submitted for publication (January to December 2010)

<table>
<thead>
<tr>
<th></th>
<th>Accepted</th>
<th>Rejected</th>
<th>Pending</th>
<th>Total</th>
<th>**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bulletin of Materials Science</td>
<td>148</td>
<td>459*</td>
<td>96</td>
<td>703</td>
<td>↑83</td>
</tr>
<tr>
<td>2. Current Science</td>
<td>618</td>
<td>1694</td>
<td>53</td>
<td>2365*</td>
<td>↑29</td>
</tr>
<tr>
<td>3. J. Astrophys. Astron.</td>
<td>8</td>
<td>50</td>
<td>6</td>
<td>64</td>
<td>↑16</td>
</tr>
<tr>
<td>4. Journal of Biosciences</td>
<td>78</td>
<td>464</td>
<td>9</td>
<td>551</td>
<td>↑75</td>
</tr>
<tr>
<td>5. Journal of Chemical Sciences</td>
<td>49</td>
<td>450</td>
<td>36</td>
<td>535</td>
<td>↑71</td>
</tr>
<tr>
<td>7. Journal of Genetics</td>
<td>91</td>
<td>206</td>
<td>12</td>
<td>309</td>
<td>↑38</td>
</tr>
<tr>
<td>8. Pramana</td>
<td>195</td>
<td>338</td>
<td>18</td>
<td>551</td>
<td>↓44</td>
</tr>
<tr>
<td>10. Resonance</td>
<td>90</td>
<td>34</td>
<td>16</td>
<td>140</td>
<td>↑30</td>
</tr>
<tr>
<td>11. Sadhana</td>
<td>33</td>
<td>153</td>
<td>62</td>
<td>248</td>
<td>↓1</td>
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<tr>
<td><strong>Total</strong></td>
<td>1429</td>
<td>4192</td>
<td>395</td>
<td>6016</td>
<td>↑340</td>
</tr>
</tbody>
</table>

* including briefer items such as news, correspondence, etc.
** As compared to last year’s figures

### Table 2

Information about published papers in journals (January to December 2010)

<table>
<thead>
<tr>
<th></th>
<th>Vol.no.</th>
<th>No. of issues</th>
<th>No. of papers</th>
<th>Total no. of pages</th>
<th>**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bulletin of Materials Science</td>
<td>33</td>
<td>6</td>
<td>112</td>
<td>768</td>
<td>↑98</td>
</tr>
<tr>
<td>2. Current Science</td>
<td>98,99</td>
<td>24</td>
<td>834</td>
<td>3534*</td>
<td>↑194</td>
</tr>
<tr>
<td>3. J. Astrophys. Astron.</td>
<td>31</td>
<td>4</td>
<td>17</td>
<td>224</td>
<td>↑14</td>
</tr>
<tr>
<td>4. Journal of Biosciences</td>
<td>35</td>
<td>4</td>
<td>72</td>
<td>692</td>
<td>↓335</td>
</tr>
<tr>
<td>5. Journal of Chemical Sciences</td>
<td>122</td>
<td>6</td>
<td>96</td>
<td>952</td>
<td>↓170</td>
</tr>
<tr>
<td>7. Journal of Genetics</td>
<td>89</td>
<td>4</td>
<td>75</td>
<td>632</td>
<td>↑86</td>
</tr>
<tr>
<td>8. Pramana</td>
<td>74,75</td>
<td>12</td>
<td>219</td>
<td>2374</td>
<td>↑178</td>
</tr>
<tr>
<td>9. Proceedings (Math. Sci.)</td>
<td>120</td>
<td>5</td>
<td>54</td>
<td>642</td>
<td>↓56</td>
</tr>
<tr>
<td>10. Resonance</td>
<td>15</td>
<td>12</td>
<td>109</td>
<td>1132</td>
<td>↓54</td>
</tr>
<tr>
<td>11. Sadhana - Engg. Sci.</td>
<td>35</td>
<td>6</td>
<td>52</td>
<td>783</td>
<td>↓297</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-</td>
<td>-</td>
<td>1706</td>
<td>12638</td>
<td>↓189</td>
</tr>
</tbody>
</table>

* including briefer items such as news, correspondence, etc.
** As compared to last year’s figures
### Table 3
Circulation details of journals (January to December 2010)

<table>
<thead>
<tr>
<th></th>
<th>Subscription</th>
<th>Complimentary</th>
<th>Fellows &amp; Associates</th>
<th>Total</th>
<th>**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>India</td>
<td>Foreign</td>
<td>India</td>
<td>Foreign</td>
<td>Fellows</td>
</tr>
<tr>
<td>1. Bulletin of Materials Science</td>
<td>2400a</td>
<td>50</td>
<td>77</td>
<td>20</td>
<td>107</td>
</tr>
<tr>
<td>2. Current Science</td>
<td>5671c</td>
<td>57d</td>
<td>160</td>
<td>56</td>
<td>44</td>
</tr>
<tr>
<td>4. Journal of Biosciences</td>
<td>2240</td>
<td>76</td>
<td>68</td>
<td>99</td>
<td>250</td>
</tr>
<tr>
<td>5. Journal of Chemical Sciences</td>
<td>1930</td>
<td>50</td>
<td>30</td>
<td>62</td>
<td>152</td>
</tr>
<tr>
<td>6. Journal of Earth System Science</td>
<td>1270</td>
<td>75</td>
<td>36</td>
<td>60</td>
<td>84</td>
</tr>
<tr>
<td>7. Journal of Genetics</td>
<td>1730</td>
<td>125</td>
<td>60</td>
<td>33</td>
<td>177</td>
</tr>
<tr>
<td>8. Pramana</td>
<td>2214</td>
<td>75</td>
<td>70</td>
<td>40</td>
<td>153</td>
</tr>
<tr>
<td>10. Resonance</td>
<td>6275b</td>
<td>50</td>
<td>190</td>
<td>07</td>
<td>-</td>
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<tr>
<td>11. Sadhana - Engg. Sci.</td>
<td>1692</td>
<td>50</td>
<td>57</td>
<td>34</td>
<td>108</td>
</tr>
</tbody>
</table>

*a. Includes about 566 MRSI members in India and abroad
b. Includes about 2487 personal subscribers
c. Includes about 1563 personal subscribers
d. Includes about 22 complimentary copies sent to Third World Countries

**As compared to last year’s figures**

### Table 4
Details of 2010 Summer Fellowships

<table>
<thead>
<tr>
<th>Subject</th>
<th>Students</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Applications received</td>
<td>Fellowships offered</td>
</tr>
<tr>
<td>1. Agricultural Sciences</td>
<td>138</td>
<td>06</td>
</tr>
<tr>
<td>2. Life Sciences</td>
<td>3902</td>
<td>391</td>
</tr>
<tr>
<td>3. Chemistry</td>
<td>1558</td>
<td>232</td>
</tr>
<tr>
<td>4. Physics</td>
<td>1002</td>
<td>139</td>
</tr>
<tr>
<td>5. Engineering</td>
<td>2880</td>
<td>187</td>
</tr>
<tr>
<td>6. Earth Sci.</td>
<td>464</td>
<td>115</td>
</tr>
<tr>
<td>7. Mathematics</td>
<td>413</td>
<td>92</td>
</tr>
<tr>
<td>Total</td>
<td>10357</td>
<td>1162</td>
</tr>
</tbody>
</table>
New Fellows (effective 1 January 2011)

Anand, Anuranjan
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
Sp: Human genetics and genomics; neurogenetics; developmental genetics

Arakeri, Jaywant H
Indian Institute of Science, Bangalore
Sp: Fluid mechanics; heat transfer; turbulence

Barman, S R
UGC-DAE Consortium for Scientific Research, Indore
Sp: Electron spectroscopy; surface science; materials studies

Bhatnagar, Rakesh
Jawaharlal Nehru University, New Delhi
Sp: Vaccine development; genetic engineering; molecular biology

Chandrasekhar, S
Indian Institute of Chemical Technology, Hyderabad
Sp: Natural product synthesis; green chemistry and combinatorial chemistry

Chattopadhyay, Samit
National Centre for Cell Science, Pune
Sp: Gene transcription and epigenetics; cancer biology; HIV and immunobiology

Chengalur, J N
National Centre for Radio Astrophysics, Pune
Sp: Radio-astronomy; galaxy evolution

Das, Amita
Institute for Plasma Research, Gandhinagar
Sp: Plasma physics; turbulence; electron magnetohydrodynamics

Gopidas, K R
National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram
Sp: Photochemistry; photoinduced electron transfer; supramolecular chemistry

Gopinath, C S
National Chemical Laboratory, Pune
Sp: Surface science; heterogeneous catalysis; spectroscopy

Gupta, Sourendu
Tata Institute of Fundamental Research, Mumbai
Sp: Particle physics; lattice field theory
Haritsa, Jayant R
Indian Institute of Science, Bangalore
Sp: Database systems; data mining; real-time systems

Jayaraman, N
Indian Institute of Science, Bangalore
Sp: Carbohydrate chemistry; dendrimer chemistry; synthetic organic chemistry

Kang, Gagandeep
Christian Medical College, Vellore
Sp: Enteric virology; vaccines

Minwalla, Shiraz
Tata Institute of Fundamental Research, Mumbai
Sp: String theory; gravity; quantum field theory

Ragahvan, K N
The Institute of Mathematical Sciences, Chennai
Sp: Representation theory

Rajshekhar, V
Christian Medical College, Vellore
Sp: Neurosurgery; cysticercosis; cervical spine surgery

Ranade, Vivek Vinayak
National Chemical Laboratory, Pune
Sp: Multiphase flows & reactors; computational flow modelling; process intensification

Rao, Madan
Raman Research Institute, Bangalore
Sp: Non-equilibrium statistical mechanics; soft condensed matter physics; biological physics

Roy, Rahul
Indian Statistical Institute, New Delhi
Sp: Probability; stochastic processes

Sengupta, Pulak
Jadavpur University, Kolkata
Sp: Metamorphic petrology

Shankar, D
National Institute of Oceanography, Goa
Sp: Tropical ocean dynamics; ocean-atmosphere interaction; monsoons

Shivaji, S
Centre for Cellular & Molecular Biology, Hyderabad
Sp: Reproductive biology; conservation biology; mammalian sperm function

Singh, Yogendra
Institute of Genomics and Integrative Biology, Delhi
Sp: Bacterial pathogenesis; biochemistry; cell biology

Srivastava, Rajesh K
Banaras Hindu University, Varanasi
Sp: Igneous petrology; geochemistry and precambrian geology
Honorary Fellows

Friend, Richard H
Cavendish Laboratory, Cambridge

Marks, Tobin J
Northwestern University, IL

Hartl, Daniel L
Harvard University, Massachusetts

Fellows Deceased

Adyalkar, P G
(b. 03.12.1927, d. 13.11.2007)
Elected: 1974
Sp: Geology, hydrogeology, seismology, mining and environment

Gopala Rao, R V
(b. 03.12.1927, d. 03.09.2010)
Elected: 1977
Sp: Physics and chemistry of liquids, solids and molecular acoustics, high temperature superconductivity, amorphous solids, theoretical physics, fullerenes device-oriented studies, quantum mechanics

Alikunhi, K H
(b. 27.05.1918, d. 26.09.2010)
Elected: 1969
Sp: Freshwater and brackishwater aquaculture, fish-prawn breeding, hatchery technology, stomatopod biology
Joshi, A B  
(b. 17.11.1916, d. 03.07.2010)  
Elected: 1975  
Sp: Crop breeding and genetics

Kapoor, L D  
(b. 27.09.1916, d. 16.04.2002)  
Elected: 1963  
Sp: Pharmacognosy, plant anatomy, medicinal and aromatic plants

Laddha, G S  
(b. 26.08.1922, d. 30.09.2010)  
Elected: 1974  
Sp: Chemical engineering, chemical technology

Mehta, M K  
(b. 24.07.1927, d. 28.06.2010)  
Elected: 1975  
Sp: Nuclear and accelerator physics, nuclear science: applications, manpower development and training

Nair N Balakrishnan  
(b. 06.07.1927, d. 21.04.2010)  
Elected: 1977  
Sp: Aquatic biology and fisheries, ecology

Radhakrishnan, V  
(b. 18.05.1929, d. 03.03.2011)  
Elected: 1968  
Sp: Astronomy, astrophysics, aeronautics

Rama Das, V S  
(b. 05.02.1933, d. 09.12.2010)  
Elected: 1975  
Sp: C4 plants, light regime in C4 plants, photosynthesis

Ramachandra, K  
(b. 18.08.1933, d. 17.01.2011)  
Elected: 1975  
Sp: analytic theory of numbers

Ramakrishna, Basava Sri  
(b. 17.10.1921, d. 12.02.2011)  
Elected: 1975  
Sp: Acoustics

Rao, D M  
(b. 04.07.1932, d. 29.12.2010)  
Elected: 1974  
Sp: Aerodynamics and fluid mechanics

Rodrigues, Veronica F  
(b. 31.03.1953, d. 10.11.2010)  
Elected: 1995  
Sp: Neurogenetics, genetics, developmental biology

Sethna, H N  
(b. 24.08.1923, d. 06.09.2010)  
Elected: 1968  
Sp: Nuclear engineering

Sirsat, S M  
(b. 07.10.1925, d. 10.07.2010)  
Elected: 1975  
Sp: Cancer research pathology, wound healing and regeneration, viruses and human cancer
Surange, K R  
(b. 07.02.1920, d. 06.01.2010)  
Elected: 1976  
Sp: Palaeobotany

Venkataramani, K S  
(b. 17.01.1924, d. 29.12.2010)  
Elected: 1968  
Sp: Horticulture, botany of tea plant, tea culture

Venkataraman, Balu  
(b. 17.12.1929, d. 28.10.2010)  
Elected: 1975  
Sp: Chemical physics

Honorary Fellow Deceased

Roy, Rustum  
(b. 03.07.1924, d. 26.08.2010)  
Elected: 1990  
Sp: Glasses and ceramics

New Associates

Ansumali, Santosh  
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore  
Sp: Kinetic theory, mesoscale methods for fluids

Bhattacharyya, Suvendra Nath  
Indian Institute of Chemical Biology, Kolkata  
Sp: Molecular cell biology, small regulatory RNA, protein translation

Datta, Ayan  
Indian Institute of Science Education and Research, Thiruvananthapuram  
Sp: Theoretical chemistry, computational material science, structure-property relationships

Datta, Ranjan  
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore  
Sp: Aberration corrected high resolution transmission electron microscopy, semiconductors for opto-electronics and spintronics

Dey, Abhishek  
Indian Association for the Cultivation of Science. Kolkata  
Sp: Inorganic, bioinorganic, Raman spectroscopy, EPR and X-ray absorption

Ganapathy, Rajesh  
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore  
Sp: Soft condensed matter
Gun, Sanoli
The Institute of Mathematical Sciences, Chennai
Sp: Number theory, modular forms, special values of SLS-functions

Jain, Tanvi
University of Delhi, Delhi
Sp: Operator theory and noncommutative geometry, topology

Mukerjee, Subroto
Indian Institute of Science, Bangalore
Sp: Condensed matter theory, many-body theory

Nair, Vijayakumar S
The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
Sp: Atmospheric aerosols, natural and anthropogenic radiative forcings, regional climate modeling, cryosphere-climate interactions

Nanda, Samik
Indian Institute of Technology, Kharagpur
Sp: Biocatalysis and biotransformation, asymmetric synthesis, organic chemistry

Natarajan, Vijay
Indian Institute of Science, Bangalore
Sp: Computational topology; scientific visualization; computational geometry

Patil, Nitin T
Indian Institute of Chemical Technology, Hyderabad
Sp: Catalytic carbophilic activation, enantioselective multiple catalysis

Ray, Partho Sarothi
Indian Institute of Science Education and Research, Mohanpur
Sp: Molecular biology, translation regulation, RNA-protein-miRNA interactions, inflammation and cancer

Shankaranarayanan, S
Indian Institute of Science Education and Research, Thiruvananthapuram
Sp: Black-hole physics; cosmology; Classical and quantum gravity

Sripati, Arun P
Indian Institute of Science, Bangalore
Sp: Neuroscience, visual perception, object recognition

Yadav, Gitanjali
National Institute of Plant Genome Research, New Delhi
Sp: Bio-informatics, computational biology, plant stress biology
A. Special Lectures

1. T Padmanabhan, Inter-University Centre for Astronomy and Astrophysics, Pune
   Gravity: A new perspective

2. K N Ganesh, Indian Institute of Science Education and Research, Pune
   Bioinspired chemistry: From PNA (‘Pune’ Nucleic Acids) to DNA nanotechnology

B. Public Lecture

Shyam Benegal, Mumbai
   Communications and culture: Tradition, modernity and postmodernism in Indian cinema

C. Lecture presentations by Fellows/Associates

1. G Rangarajan, Indian Institute of Science, Bangalore
   Synchronized extinction of species under external forcing

2. A K Kembhavi, Inter-University Centre for Astronomy and Astrophysics, Pune
   Big data—is the end of observational astronomy in sight?

3. Nitin Chattopadhyay, Jadavpur University, Kolkata
   A facile strategy for the detection and estimation of cyanide ion in water

4. T Karthikeyan, Indira Gandhi Centre for Atomic Research, Kalpakkam
   Grain boundary engineering of ferritic steels

5. Amit K Patra, National Atmospheric Research Laboratory, Chittoor
   High-power radar probing of ionospheric plasma irregularities

6. Shally Awasthi, C. S. M. Medical University, Lucknow
   Six-monthly vitamin A from 1 to 6 years of age—DEVTA trial: Cluster-randomized trial in one million children in north India

7. Pradip K Chakraborti, Institute of Microbial Technology, Chandigarh
   Understanding mycobacterial N-terminal methionine excision pathway

8. S K Khanduja, Panjab University, Chandigarh
   Some extensions and applications of Eisenstein irreducibility criterion

9. R Gopakumar, Harish Chandra Research Institute, Allahabad
   The journey from Maxwell to Faraday

10. B S Murty, Indian Institute of Technology, Chennai
    Excitements and challenges in advanced materials research by non-equilibrium processing

11. P K Ghosh, Central Salt & Marine Chemicals Research Institute, Bhavnagar
    Case studies of recent innovations in the area of salt and marine chemicals

12. S R Kotha, Indian Institute of Technology, Mumbai
    Development of new synthetic methods

13. D Ramaiah, National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram
    Design of functional molecules for biological applications

14. Narendra Tuteja, International Centre for Genetic Engineering & Biotechnology, New Delhi
    A single-subunit MCM6 from pea functions as DNA helicase

15. K S Narayan, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
    Noise features in the bacteriorhodopsin photocycle

16. S Chattopadhyay, National Institute of Technology, Durgapur
    Z-box binding factor in light signal-controlled plant growth and development
A. Presidential Address

A K Sood, Indian Institute of Science, Bangalore
Nanotube dynamo and graphene

B. (a) Symposium: Indian estuaries

1. M. Dileep Kumar, National Institute of Oceanography, Goa
Estuaries - An introduction

2. D Shankar, National Institute of Oceanography, Goa
Nature of freshwater influx in Indian estuaries

3. S R Shetye, National Institute of Oceanography, Goa
Monsoonal estuaries

4. V V S S Sarma, National Institute of Oceanography, Goa
Biogeochemistry in estuarine systems

5. A C Anil, National Institute of Oceanography, Goa
Influence of monsoon on estuarine ecosystem

6. V Purnachandra Rao, National Institute of Oceanography, Goa
Impact of mining on suspended materials in estuaries

7. M D Zingde, National Institute of Oceanography, Goa
Status of pollution in Indian estuaries

(b) Symposium: Stem cells in development and regeneration: From the bench to bedside and back

1. Satyajit Mayor, National Centre for Biological Sciences, Bangalore
Local and regulated organization of membrane components during stem cell differentiation

2. Geeta K Vemuganti, LV Prasad Eye Institute, Hyderabad
Cell therapy for ocular surface: A successful model of regenerative medicine

3. Shubha Tole, Tata Institute of Fundamental Research, Mumbai
How stem cells build the brain

4. Vidita A Vaidya, Tata Institute of Fundamental Research, Mumbai
Adult neural stem cells: Relevance to the treatment of psychiatric disorders

5. Shyamala Mani, Indian Institute of Science, Bangalore
Stem cells and the brain
C. Special Lectures
1. A K Singhvi, Physical Research Laboratory, Ahmedabad
Synergistic mutualism between geology and physics: The case of luminescence geochronometry

2. Kanury V S Rao, International Centre for Genetic Engineering and Biotechnology, New Delhi
The dynamics of host-pathogen interactions in TB infection

D. Public Lectures
1. C Raja Mohan, Strategic Affairs Editor, The Indian Express, New Delhi
India and the Indian Ocean: In search of a strategic role

2. Kaushik Basu, Chief Economic Adviser, Govt. of India, New Delhi
Higher Education and economic development

E. Lecture presentations by Fellows/Associates
1. Bharat B Chattoo, MS University, Baroda
Engineering plants for disease resistance: Challenges and opportunities

2. U Ramamurty, Indian Institute of Science, Bangalore
Structural materials for the future: The case of bulk metallic glasses

3. Samar K Das, University of Hyderabad, Hyderabad
Metal-oxide based inorganic systems toward practical applications

4. Samrat Mukhopadhyay, Indian Institute of Science Education and Research, Chandigarh
How do proteins misfold and aggregate?

5. N K Mondal, Tata Institute of Fundamental Research, Mumbai
Neutrinos: A new window to the Universe

6. Pawan Dewangan, National Institute of Oceanography, Goa
Marine gas hydrates - an untapped non-conventional energy resource

7. J. Narasimha Moorthy, Indian Institute of Technology, Kanpur
Molecular design for manipulation of organic material properties

8. R Sankaranarayanan, Centre for Cellular and Molecular Biology, Hyderabad
Proofreading during translation of the genetic code

9. Rama Govindarajan, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
Vortices in density gradients: Mergers, split-ups and death

10. R Sowdhamini, National Centre for Biological Sciences, Bangalore
Distant relationships amongst protein domains

11. K Subramanian, Inter-University Centre for Astronomy and Astrophysics, Pune
Magnetizing the Universe

12. Sudeshna Sinha, Indian Institute of Science Education and Research, Chandigarh
Logical stochastic resonance: Exploiting the interplay between noise and nonlinearity to enhance computations

13. Anurag Kumar, Indian Institute of Science, Bangalore
Design and optimization problems in wireless sensor networks

14. Amitabha Mukhopadhyay, National Institute of Immunology, New Delhi
Hemoglobin endocytosis in ‘Leishmania’: A novel target

15. T S S R K Rao Indian Statistical Institute, Bangalore
An invitation to the geometry of higher dual spaces

16. Kalobaran Maiti, Tata Institute of Fundamental Research, Mumbai
Puzzles in magnetism

17. Paramjit Khurana, University of Delhi South Campus, New Delhi
Genes associated with embryogenesis and abiotic stress tolerance in wheat

18. Suhrit Ghosh, Indian Association for the Cultivation of Science, Kolkata
To mix or not to mix? Assembly of donor and acceptor chromophores

* * * * * * * *
# RECEIPTS AND PAYMENTS FOR THE YEAR ENDING 31 MARCH 2011

(Amount in rupees)

## RECEIPTS

<table>
<thead>
<tr>
<th>I Opening Balances:</th>
<th>2010-2011</th>
<th>2009-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Cash in hand</td>
<td>37,958</td>
<td>45,394</td>
</tr>
<tr>
<td>b) Bank balances</td>
<td>15,051,486</td>
<td>2,875,598</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II Grants received:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) From Govt. of India</td>
<td>89,800,200</td>
<td>90,000,000</td>
</tr>
<tr>
<td>b) From other sources</td>
<td>19,639,809</td>
<td>12,049,965</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>III Income on investments</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Earmarked endowment funds</td>
<td>132,601</td>
<td>3,402,236</td>
</tr>
<tr>
<td>b) Own funds</td>
<td>1,583,014</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IV Interest received</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) On bank deposits</td>
<td>1,553,289</td>
<td>393,033</td>
</tr>
<tr>
<td>b) Loans, advances, etc.</td>
<td>55,502</td>
<td>24,000</td>
</tr>
</tbody>
</table>

| V Other Income             | 14,497,903| 16,782,457|

| VI Any other Income        | 359,314   | 110,000   |

| VII Investments matured   | 8,500,000 | 17,600,000|

**TOTAL** 151,211,076 143,282,683

## PAYMENTS

<table>
<thead>
<tr>
<th>I Expenses:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Establishment expenses</td>
<td>19,225,314</td>
<td>16,911,345</td>
</tr>
<tr>
<td>b) Administrative expenses</td>
<td>71,258,571</td>
<td>61,433,438</td>
</tr>
</tbody>
</table>

| II Investments and deposits made out of own funds | 12,745,000 | 26,500,000 |

<table>
<thead>
<tr>
<th>III Expenditure on:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Fixed assets</td>
<td>3,881,545</td>
<td>2,077,225</td>
</tr>
<tr>
<td>b) Capital work in progress</td>
<td>Nil</td>
<td>11,100,000</td>
</tr>
<tr>
<td>c) Land</td>
<td>Nil</td>
<td>3,000,000</td>
</tr>
</tbody>
</table>

| IV Refund of surplus money/loans | 28,000,000 | Nil |

| V Other payments | 2,596,225 | 7,171,231 |

<table>
<thead>
<tr>
<th>VI Closing balances:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Cash in hand</td>
<td>98,323</td>
<td>37,958</td>
</tr>
<tr>
<td>b) Bank balances</td>
<td>13,406,098</td>
<td>15,051,486</td>
</tr>
</tbody>
</table>

**TOTAL** 151,211,076 143,282,683

As per our report of even date annexed
For B R V GOUD & Co
Chartered Accountants

Place: Bangalore
Date: 10.06.2011

Sd/- (A K Sood) (S Chandrasekaran) (G Chandramohan) (A B Shiva)
President Treasurer Executive Secretary Partner
## INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31 MARCH 2011

<table>
<thead>
<tr>
<th>Particulars</th>
<th>2010-2011</th>
<th></th>
<th>2009-2010</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plan</td>
<td>Non-Plan</td>
<td>Plan</td>
<td>Non-Plan</td>
</tr>
<tr>
<td>A. INCOME</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grants/subsidies</td>
<td>76,033,672</td>
<td>4,120,000</td>
<td>89,183,074</td>
<td>4,622,500</td>
</tr>
<tr>
<td>Fees/subscriptions</td>
<td>Nil</td>
<td>7,253,111</td>
<td>Nil</td>
<td>6,238,622</td>
</tr>
<tr>
<td>Income from royalty, publications etc.</td>
<td>Nil</td>
<td>6,400,364</td>
<td>Nil</td>
<td>4,383,747</td>
</tr>
<tr>
<td>Interest earned</td>
<td>Nil</td>
<td>1,883,944</td>
<td>Nil</td>
<td>393,033</td>
</tr>
<tr>
<td>Other income</td>
<td>Nil</td>
<td>1,125,091</td>
<td>Nil</td>
<td>340,104</td>
</tr>
<tr>
<td><strong>Total (A)</strong></td>
<td>76,033,672</td>
<td>20,782,510</td>
<td>89,183,074</td>
<td>15,978,006</td>
</tr>
<tr>
<td>B. EXPENDITURE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establishment expenses</td>
<td>4,568,483</td>
<td>13,909,539</td>
<td>7,289,317</td>
<td>9,623,028</td>
</tr>
<tr>
<td>Other administrative expenses</td>
<td>67,943,763</td>
<td>6,874,517</td>
<td>74,983,786</td>
<td>6,355,994</td>
</tr>
<tr>
<td><strong>Total (B)</strong></td>
<td>72,512,246</td>
<td>20,784,056</td>
<td>82,273,103</td>
<td>15,979,022</td>
</tr>
<tr>
<td>C. Surplus/(Deficit)</td>
<td>3,521,426</td>
<td>(1,546)</td>
<td>6,909,971</td>
<td>(1,016)</td>
</tr>
</tbody>
</table>

**As per our report of even date annexed**

For B R V GOUD & Co
Chartered Accountants

Place: Bangalore
Date: 10.06.2011
(Sd/- A K Sood) (Sd/- S Chandrasekaran) (Sd/- G Chandramohan) (Sd/- A B Shiva)
President Treasurer Executive Secretary Partner

---

## BALANCE SHEET AS ON 31 MARCH 2011

<table>
<thead>
<tr>
<th>Sources of Funds</th>
<th>2010-2011</th>
<th>2009-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corpus/capital fund</td>
<td>139388923</td>
<td>116419731</td>
</tr>
<tr>
<td>Earmarked/endowment funds</td>
<td>11991861</td>
<td>12056660</td>
</tr>
<tr>
<td>Current liabilities and provisions</td>
<td>7090806</td>
<td>8750938</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>158471590</td>
<td>137227329</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assets/Application of Funds</th>
<th>2010-2011</th>
<th>2009-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed assets</td>
<td>74617409</td>
<td>56398731</td>
</tr>
<tr>
<td>Investments: from earmarked/endowment funds</td>
<td>10245000</td>
<td>7700000</td>
</tr>
<tr>
<td>Investments: others</td>
<td>56030000</td>
<td>54330000</td>
</tr>
<tr>
<td>Current assets, loans, advances etc.</td>
<td>17579181</td>
<td>18798598</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>158471590</td>
<td>137227329</td>
</tr>
</tbody>
</table>

**As per our report of even date annexed**

For B R V GOUD & Co
Chartered Accountants

Place: Bangalore
Date: 10.06.2011
(Sd/- A K Sood) (Sd/- S Chandrasekaran) (Sd/- G Chandramohan) (Sd/- A B Shiva)
President Treasurer Executive Secretary Partner