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March 2017

Newsletter of the Indian Academy of Sciences

EIGHTY-SECOND ANNUAL MEETING

4–6 NOVEMBER 2016

The three-day 82nd Annual Meeting of the Indian Academy of Sciences, hosted by the Indian Institute of Science Education and Research, Bhopal, saw enthusiastic participation of members of the scientific and teaching community across the nation, with 91 Fellows and Associates of the Academy and 41 invited teachers attending the event.

The event began with the Presidential Address by **Ramakrishna Ramaswamy** (JNU, New Delhi), who spoke on 'Chimeras: A spontaneous emergence of dynamical

disorder'. Chimeras are the spontaneous emergence of a dynamic state with a mix of order and disorder. He spoke of his work on the physical and mathematical models for

Inside...

1. Eighty-Second Annual Meeting 1
2. Elections 2016 9
3. Special Issues of Journals 11
4. Discussion Meetings 12
5. Promotion of Academy Journals 13
6. Hindi Workshops 13
7. Academy Public Lectures 14
8. Repository of Scientific Publications of Academy Fellows 14
9. 'Women in Science' panel programmes 15
10. Vigilance Awareness Week 16
11. Summer Research Fellowship Programme for Students and Teachers – 2017 17
12. Refresher Courses and Lecture Workshops 17
13. National Science Day 23
14. Obituaries 24

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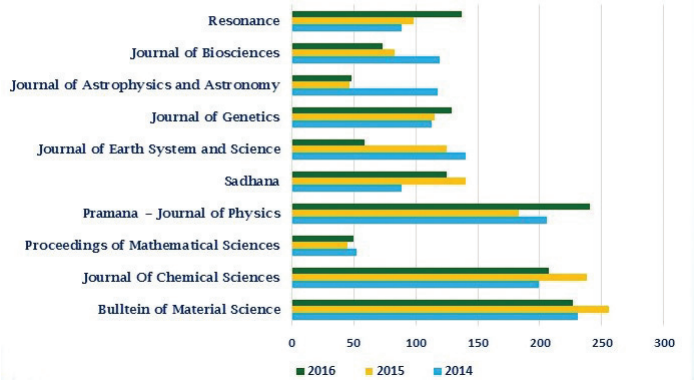
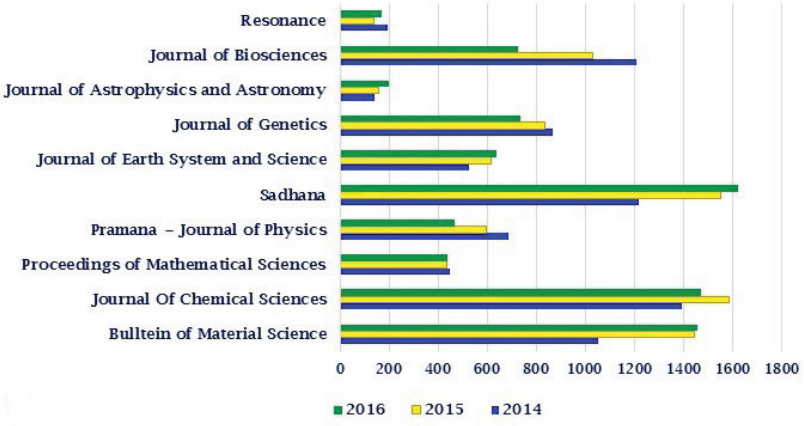
Articles published [2014 – 2016]



Papers submitted [2014 – 2016]



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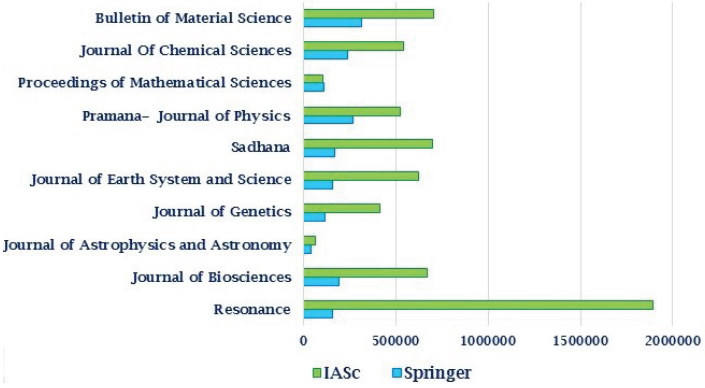


Chimeras in various systems, and the significance of Chimeras, particularly in biological processes such as uni-hemispheric sleep and ventricular fibrillation.

A special attraction of the first day of the meeting was the launch of **CNR Rao**'s book *A Life in Science*, published by Penguin India. The book

captures his long academic journey spanning 65 years and the trials and tribulations of a career in Science. Rao mentions, in his book, several of his heroes in Science and how they have been a constant source of inspiration to him. He hopes the book will make Science as dear to the reader as it is to him.

A public lecture by **CNR Rao** on "How India Can be a World Leader in Science" followed. He spoke of how

Science was receiving insufficient funding in India, which is one of the reasons why India's contribution to Science was fairly small. He advised students to choose good problems to work on. He said that the mindset of Indian society should change to one which places the highest value on Science and Education. He regaled the students of IISER Bhopal in a jam-packed auditorium with stories of Raman and Faraday, who despite adversities changed the face of Science.

In this series of Inaugural Lectures by the newly elected Fellows and Associates of the Academy, the first session began with a presentation by **Arun Chattopadhyay** (IIT, Guwahati), who spoke on an interesting new study that deals with complexation reaction on the surface of the quantum dot. The chemical reaction between the labile surface metal ion and an external organic ligand results in the formation of inorganic complexes on the quantum dot which not only alters the property of the quantum dot but also confers additional properties. This finds potential applications in chemical catalysis, light-emitting devices, medical imaging, solar cells, lasers and electronic devices.

Sanjib K Agarwalla (IOP, Bhubaneswar) discussed the three-flavour oscillation picture of neutrinos in light of the recent discovery of the smallest lepton mixing angle. He also spoke of the projects to be handled by the India-based Neutrino Observatory.

Autoimmune diseases have considerably increased globally, and treatments using non-steroidal anti-inflammatory drugs, corticosteroids, disease-modifying antirheumatic drugs, and immunosuppressive agents are associated with limitations and side effects. **Javed N Agrewala**'s (IMTECH, Chandigarh) group has verified the role of Caerulomycin A – a bacterial compound with antifungal and antibiotic properties – as a new drug to cure arthritis. Using animal models, they found that CaeA restrains arthritis symptoms by inducing the generation of Tregs and suppressing pro-inflammatory factors. They have patented their technology.

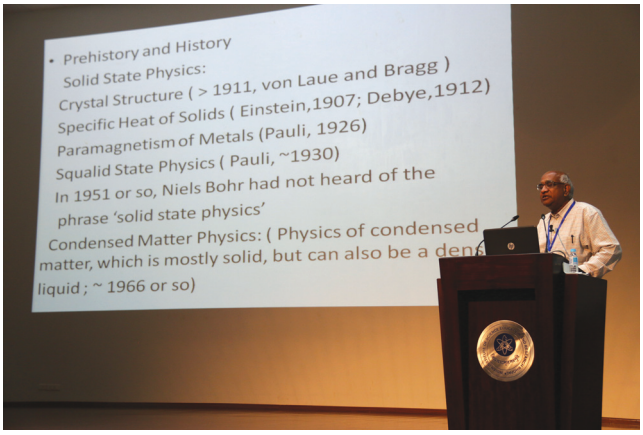
Starting with some of the classical examples of special values of L-functions, **A Raghuram** (IISER, Pune) conveyed the grandeur of this subject that draws upon several different areas of modern mathematics such as representation theory, algebraic and differential geometry, and harmonic analysis.

Walter Kohn Memorial Symposium

Commemorating the contributions of Noble Laureate Walter Kohn, whose work has revolutionized the understanding of electronic properties of materials, a special 'Walter Kohn Memorial Symposium' was conducted on the first day of the meeting.

HR Krishnamurthy (IISc, Bengaluru) chaired the session and presented a brief life timeline of Noble Laureate Walter Kohn.

TV Ramakrishnan (BHU, Varanasi) traced the history and origin of the field of condensed matter physics and the crucial role that Walter Kohn played in



the evolution of the field from obscurity to present prominence. Presenting an overview of the work by various researchers, Ramakrishnan highlighted the contributions of Walter Kohn in various aspects of electron theory of solids.

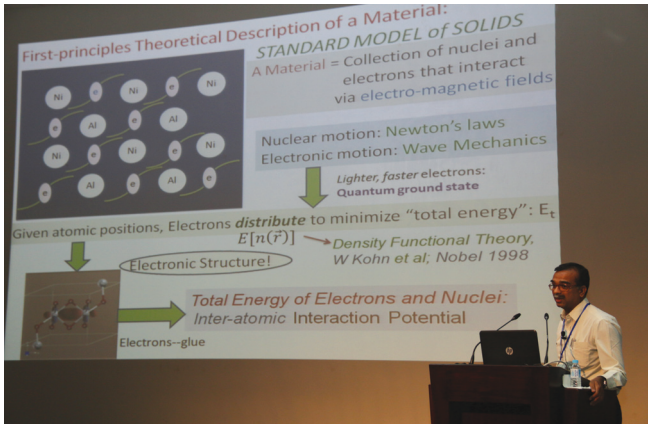
Tracing the history of density functional theory which arose from the single-particle electron density idea proposed by Walter Kohn, **Swapan K Ghosh**

(BARC, Mumbai) discussed how, despite the differences in the nature of the density variables used in various DFT-based descriptions, the corresponding theoretical frameworks, share a unified structure. Ghosh elaborated on some of the developments and applications of DFT in diverse areas of Chemistry and Physics.

Tanusri Saha-Dasgupta (SNBNCBS, Kolkata) spoke about specific situations when the conventional DFT proves insufficient to predict the properties of

materials. In such situations, DFT along with the Coulomb correlation, namely Hubbard U, and DFT along with Dynamical Mean Field Theory or DMFT are used. The effectiveness of these methods through applications in describing charge-ordered insulators and correlated metals was described.

Umesh V Waghmare (JNCASR, Bengaluru) discussed his work on deciphering the interesting relationship between Wannier functions and non-Abelian Berry



phases of Bloch electrons. The idea is centrally relevant to the non-trivial electronic topology exhibited by topological insulators, Weyl and Dirac semimetals.

The first day concluded with a very inspiring talk by renowned water conservationist and Stockholm Water

Prize and Magsaysay Awardee, **Rajendra Singh**, from Tarun Bharat Sangh.

Preferring to talk in Hindi, he spoke passionately about how traditional water management systems, now long forgotten, would effectively meet the rising demand for water of today. He spoke of his experiences in Rajasthan, where, by use of traditional methods, several rivers that had dried up were now perennial. The methods used were unique to each agro-ecological zone, thus ensuring sustainability the river. He appealed to scientists to use their technology in conjunction with indigenous knowledge systems to come up with strategies to ensure the rivers of India be saved and remain the life-giving forces they are. He concluded on an ominous note that if we did not act now to save our rivers, the world would see a water war soon.

The second day began with a special lecture on Academic Ethics by **Sunil Mukhi** (IISER, Pune). Based on the document on Scientific Values prepared under the

aegis of the Academy, he spoke on what ethics means. He elaborated on the contents of the document, with special emphasis on how to conduct research ethically. He focussed on publication ethics, by providing various definitions of plagiarism. He talked about how to paraphrase without plagiarising. He ended his talk with actions publishers must take towards spotting plagiarised papers.

Continuing the series of Inaugural Lectures by Fellows and Associates of the Academy, **Pradyut Ghosh** (IACS, Kolkata) spoke on his work on anion recognition by synthetic receptors, which finds application in water purification processes and industrial and nuclear waste reprocessing. A wide variety of receptors (ligands) containing different anion recognition elements with increasing complexities have been developed by the speaker's team. Their recent work deals with (i) selective sensing of phosphates; (ii) separation of hydrated metal sulphates/potassium bromide; and (iii) halogen-bonding-assisted bromide removal.

Starting with Shannon's noisy channel coding theorem, **Ankur A Kulkarni** (IIT, Bombay) spoke about the open question about finite blocklength performance and the existing solutions. His group used convex relaxations and linear programming duality to obtain lower bounds for problems in information theory, which has resolved open issues about the role of Shannon theory in stochastic decentralized control and a 60-year-old open combinatorial problem posed by Levenshtein for the deletion channel.

Some of the most energetic events in the Universe are the explosive transients – gamma-ray burst sources (GRBs), supernovae and novae. **GC Anupama** (IIA, Bengaluru) spoke on the observational properties of these sources and mentioned the facilities that will be coming up in the next decade to observe these phenomena: the Large Synoptic Survey Telescope (LSST) and the Giant Segmented Large Telescopes.

Cellular stress response is a general term referring to a wide range of molecular changes that cells undergo in response to environmental stressors, including extremes of temperature, exposure to toxins, and mechanical damage. **S Ganesh** (IIT, Kanpur) spoke of his group's finding that Sat3 transcripts are required for the full protection from heat-shock-induced cell death, and that the loss of these transcripts leads to a partial relief of heat-shock-induced transcriptional repression.

Tuberculosis (TB), caused by Mycobacterium tuberculosis (Mtb), afflicts about one-third of the world population. **KN Balaji** (IISc, Bengaluru) spoke of the ability of Mtb to strategize host miRNAs for inhibition of autophagy and to plant host epigenetic modifiers

for generation of foamy macrophages to create a haven in the hostile environment offered by the host.

Charge is transferred between the atoms in a Quantum Dot (QD). The transferred charge resides in a quantum confined state. The Quantum Dot electronic structure can be approximated remarkably well as a Spherical Particle in a Box problem. The formation mechanisms and the reasons behind the emergence of atom-like characteristics in QDs were described by **Anshu Pandey** (IISc, Bengaluru). QDs react the same way as atoms and their 'chemistry' allows the synthesis of stoichiometric compounds, he added. Various examples of chemical reactions between QDs and the energetics of such reactions were described.

Symposium on '*Our Second Genome*'

The recent decades have seen unprecedented developments in the field of biological sciences. Armed with novel tools and next-generation sequencing technologies biologists are delving deep into the molecular realms of life. The buzzword in this context has been the microbiome. Celebrating these achievements of biological sciences and focusing on the science of microbiome, a special symposium on "Our Second Genome" was organised on the second day of the meeting.

Tracing the origin and history of the discipline of microbiome **Partha P Majumder** (NIBMG, Kolkata) introduced the audience to the emerging field of

microbiome and highlighted the microbiome diversity in human systems. He discoursed the need of understanding the relationship of "our second genome" with that of our own genome and gave an overall view of the novel insights on microbiome, especially in the context of human health and wellbeing.

The gut microbiome is related to many human disorders including diabetes and cardiovascular disorders. They are even known to play a major role in antibiotic resistance and bioavailability of drugs. **Sharmila S Mande** (TCS, Pune) discussed the composition and functions of the microbiome of the human gut and the

challenges in estimating the taxa diversity, identity and genes of gut microbes. An end-to-end metagenomics platform is being developed by her team to analyse the microbiome data generated from various sequencing platforms. Their study will give important clues to the differences in gut microbiome across age, environment, and population, opening up novel avenues of translational and personalized medicine.

Vineet K Sharma (IISER, Bhopal) discussed his metagenomics studies of healthy and diseased individuals in Indian population. The links between gut flora and disorders such as malnourishment,

tuberculosis, and mental disorders highlight the need to develop robust platforms to analyse microbiome. Novel metabolic capabilities of human gut flora involved in the metabolism of different food substrates and xenobiotics were revealed during the speaker's analyses.

Microbiome is not restricted to the gut. In fact, microbes are dominant in skin, the largest organ of the human

body, and have direct implications on skin health. **Souvik Mukherjee** (NIBMG, Kolkata) focused on his work on the characterisation of facial skin microbiome in the Indian population of Dravidian descent.

Shekhar C Mande (NCCS, Pune), proposing a large-scale study on the Indian population and microbiota highlighted the need of "The Indian human microbiome initiative". The large-scale project is conceptualized

to address some of the fundamental questions related to the effect of microbiota on human health, especially in the context of the Indian population. Mande outlined the study design and coordination plan for the collaborative initiative which aims to cover 90 communities and 20,000 subjects across various geographic regions with the objective of mapping of microbiota of five different body sites. **Malhotra** joined the discussion and provided insights on the various dimensions of mapping microbiota across different races.

The second day of the meeting ended with a public lecture by **Ravi Korisettar** from Dr. VS Wakankar Archaeological Research Institute, who took the audience on a virtual geological tour with his talk on the importance of the Vindhya basin in the prehistory of the Indian subcontinent. The speaker traced the journey of early human beings (*Homo erectus*) from

Africa to the Indian subcontinent. Highlighting the importance of Vindhya basin in studying the pattern of dispersal of ancient humans in India, he presented the evidence gathered from various Paleolithic sites in the Vindhya basin which help researchers understand the migration and habitation pattern of early humans in India and the factors that aided this migration.

The second day concluded with a wonderful Mehfil-e-Shama Qawwali by Emerald – The Band.

The third day's Inaugural Lectures began with **Krishna P Kaliappan** (IIT, Mumbai). He outlined the novel procedures developed by his team to synthesize complex compounds such as vinigrol, taxol, and N-heterocyclic amides through a minimum number of steps to achieve ideal synthesis. The molecules are considered crucial because of their biological activity and the newly developed methods overcome many drawbacks of the conventional synthesis techniques of such molecules.

Appa Rao Podile (UoH, Hyderabad) shared his research, elaborating on the process of plant immunity triggered upon infection by pathogens and the progress made towards understanding this process. A major player in such immunity involves chitooligosaccharides released during plant-fungal interactions that elicit plant defence. The speaker discussed his work on identifying enzymes like chitinase(s), which help in the chemical process of transglycosylation and generation of long-chain chitooligosaccharides that triggers immunity.

N Ravishankar (IISc, Bengaluru) discussed the simple wet chemical method for growing ultrathin gold nanowires in a phase developed by his team along with detailed description of the mechanism of gold nanowires using electron microscopy as the principal supporting tool. The fascinating insulating

behaviour of gold nanowires corresponding to decrease in resistivity as a function of the temperature of measurement was presented. The gold nanowires are likely to find potential applications in developing sensors and aiding catalysis

In the recent years, CRISPR-Cas technology has emerged as one of the most robust molecular biology techniques ever developed. **B Anand** (IIT, Guwahati) explored how bacteria integrate phage fragments to acquire immunity in the CRISPAR-Cas pathway. His work on how the pathway involving various complexes confers heritable adaptive immunity to bacteria serving as immunological memory was discussed.

Analytic functions are extremely important in Physics, Chemistry, Electrical Engineering, etc. **Tirthankar Bhattacharyya** (IISc, Bengaluru) explained what analytic functions were with several illustrations such as the disc and bidisc formulae, and the transfer function used in input-output systems by engineers.

Low-temperature scanning tunneling spectroscopy has emerged as one of the most powerful tools to study electronic properties of solids at low temperature, with unsurpassed spatial and energy resolution. **Pratap Raychaudhuri** (TIFR, Mumbai) spoke of the basics of this technique and the low-temperature scanning tunneling microscope developed in TIFR.

Evolution and extinction of life are tied intimately to the seawater chemistry. Reconstruction of the temporal changes in the redox state of seawater is crucial in understanding the trace elemental inventory of oceans and its influence on the biosphere. **G R Tripathy** (IISER, Pune) spoke of his work on the 187Re-187Os systematic of organic-rich marine sediments, which uniquely provides reliable information on their depositional age and past marine chemistry.

The 82nd Annual Meeting concluded with a special lecture on *'Experimental ecology and evolution in the laboratory'* by **Amitabh Joshi** (JNCASR, Bengaluru). The opportunities offered by experimental ecology

and evolution studies in laboratory settings aid the study of evolutionary and ecological mechanisms, which are otherwise not possible in the wild. What makes Drosophila the ideal biological model to answer questions at the interface of ecology and evolutionary biology was highlighted in his lecture on various aspects of heredity, development, and ecology of Drosophila populations. These studies illustrated how the evolutionary process is far more subtle and responsive to minor changes in ecology than often perceived.

FELLOWS – 2017

Aninda J. Bhattacharyya
Indian Institute of Science, Bengaluru
Sp: Materials chemistry, Electrochemistry

Suvendra N. Bhattacharyya
CSIR – Indian Institute of Chemical Biology, Kolkata
Sp: Molecular biology, Cell biology, RNA biology

Mitali Chatterjee
Institute of Postgraduate Medical Education & Research, Kolkata
Sp: Pharmacology, Immunology, Parasitology

Prasanta K. Das
Indian Association for the Cultivation of Science, Kolkata
Sp: Bio-organic chemistry, Supramolecular self-assemblies, Enzymology, Soft nanocomposite in cellular transportation

Swapan K. Datta
Visva-Bharati University, Santiniketan
Sp: Plant biotechnology, Genetic engineering, Crop improvement

Ashutosh Ghosh
University of Calcutta, Kolkata
Sp: Co-ordination chemistry, Crystal structure, Magnetic properties and catalysis; Analytical chemistry

Sundargopal Ghosh
Indian Institute of Technology, Chennai
Sp: Main-group chemistry, Organometallic chemistry

Srubabati Goswami
Physical Research Laboratory, Ahmedabad
Sp: High energy physics, Astroparticle physics, Neutrino physics

Maneesha S. Inamdar
JN Centre for Advanced Scientific Research, Bengaluru
Sp: Stem cell biology, Cardiovascular Development, Hematopoiesis and angiogenesis

Santosh Kapuria
Indian Institute of Technology, New Delhi
Sp: Structural mechanics, Multi-functional structures, Structural health monitoring

Navin Khanna
International Centre for Genetic Engineering and Biotechnology, New Delhi
Sp: Dengue subunit vaccine, Dengue botanical drug, Recombinant proteins of medical use

Vijay Kodiyalam
The Institute of Mathematical Sciences, Chennai
Sp: Operator algebras, Commutative algebr

Raghavan Krishnan
Indian Institute of Tropical Meteorology, Pune
Sp: Monsoon and climate dynamics, Atmosphere-ocean-land system, Monsoon hydrological cycle

Roop Mallik
Tata Institute of Fundamental Research, Mumbai
Sp: Intracellular transport, Motor protein complexes

Bedangadas Mohanty
National Institute of Science Education and Research, Khordha
Sp: Experimental high-energy physics, Phase diagram of quantum chromodynamics

Ritabrata Munshi
Indian Statistical Institute, Kolkata
Sp: Analytic number theory, Automorphic forms, Elliptic curves

Sudhakar Panda
Institute of Physics, Bhubaneswar
Sp: High-energy physics, String theory, Cosmology, Quantum field theory

N. B. Ramachandra
University of Mysore, Mysuru
Sp: Drosophila genetics and evolution, Human genetic disorders, Genome genetics

Sumathi Rao
Harish Chandra Research Institute, Allahabad
Sp: Theoretical condensed matter physics, Quantum field theory

S. Sankararaman
Indian Institute of Technology, Chemaai
Sp: Organometallic chemistry, Organic photochemistry, Time-resolved spectroscopy

Kaustuv Sanyal
JN Centre for Advanced Scientific Research, Bengaluru
Sp: Eukaryotic chromosome segregation, Epigenetic regulation, Genetics and genomics of fungal pathogens

Sagar Sengupta
National Institute of Immunology, New Delhi
Sp: Cancer biology, Cell signalling, Mytochondrial biology

R. L. Sujith
Indian Institute of Technology, Chennai
Sp: Thermoacoustic instability, Combustion, Fluid mechanics

R. B. Sunoj
Indian Institute of Technology, Mumbai
Sp: Computational chemistry, Theoretical chemistry

P. Vijay Kumar
Indian Institute of Science, Bengaluru
Sp: Error correcting codes, Wireless communication, Pseudorandom sequence design

G. D. Yadav
Institute of Chemical Technology, Mumbai
Sp: Green chemistry and engineering, Catalysis science and engineering

S. M. Yusuf
Bhabha Atomic Research Centre, Mumbai
Sp: Magnetism, Advanced magnetic materials, Neutron scattering, Condensed matter physics

Honorary Fellows

Manjul Bhargava
Princeton University
Princeton, USA

C. Jagadish
The Australian National University
Canberra, Australia

SPECIAL ISSUES OF JOURNALS

Special Issue on Chemical Bonding

Editors: Eluvathingal D. Jemmis, Elangannan Arunan and V. Subramanian

Journal of Chemical Sciences
Volume 128, Issue 10, October 2016

This special issue of the Journal of Chemical Science celebrates the 100th year of the 'electron pair bond' proposed by G. N. Lewis.

This issue has articles on all types of bonds, not limited to the 'covalent bond' proposed by Lewis and named so by Langmuir. It covers the bond between noble gases and noble metals in an article by Ghara, Pan, Deb, Kumar, Sarkar and Chattaraj. Though the inertness of the 'noble gases' led Lewis to propose the covalent bond, it did not take long for chemists to realize that noble gases can form bonds with other elements, under appropriate conditions. Hydrogen bonding is discussed in articles by Banerjee, Bhattacharya and Chakraborti; Karir, Fathima and Viswanathan; and Shahi and Arunan. Pavan and Guru Row discuss Cl•••Cl and Cl•••Br halogen bonds in the crystal structure of 4-bromo-2-chlorobenzoic acid. Shukla and Chopra discuss the substitution effect on S•••F chalcogen bond. Dhindhwal and Sathyamurthy describe the effect of hydration on cation-p interactions between benzene and various cations. Coordinate bonding is discussed in articles by Kathooria, Arfeen, Bankar and Bhartam, and Velmurugan, Rajeshkumar and Rajaraman. Bonding properties on high energy solids under high pressure is discussed in the article by Vaitheeswaran, Yedukondalu and Abraham. Lithium adsorption on monolayers of carbonaceous materials is discussed by Panigrahi, Umadevi and Narahari Sastry. Choudhuri, Mahata, Rawat and Pathak discuss the effect of Ti doping in $Al(BH_4)_3$ on the dehydrogenation reactions. Jemmis and Priyakumari discuss bonding in hypervalent oligo-sulfuranes. Sasmal, Talukdar, Nayak, Vaval and Pal discuss the hyperfine structure constants in small molecules and these reflect the nature of bonding in these molecules. Gadre and Kumar; Bijina and Suresh; and Vinodh Kumar, Raghavendra and Subramanian discuss the importance of electrostatic potential/electron density topology in understanding various types of bonding.

The articles in this special issue demonstrate the variety in bonding and the many ways, both experimental and theoretical, of investigating them. We thank the enthusiastic support received from all the authors, who have contributed to this special issue. We also thank the Editor for the invitation and support and the members of the Journal Staff for the excellent support during the compilation of this issue.

Science with the Square Kilometre Array: An Indian Perspective

Editors: Tirthankar Roy Choudhury and Yashwant Gupta

Journal of Astrophysics and Astronomy
Volume 37, Issue 4, December 2016

The Square Kilometre Array (SKA) is one of the most prominent and ambitious of the next-generation radio astronomy facilities. It is so large that planning, designing and building SKA requires the international collaborations of ten countries, India being one of them. The first phase, SKA1, is in the design phase, and is expected to be operational by 2022. Indian scientists are looking to enhance their scientific contribution to SKA, and also to build a base of astronomers that will be prepared to use the facility when it is ready. The science initiatives in different areas are coordinated by the SKA India Science Working Groups (SWGs). The Indian SWG is instrumental in creating awareness related to the SKA within the Indian scientists by organizing talks, workshops, meetings, etc.

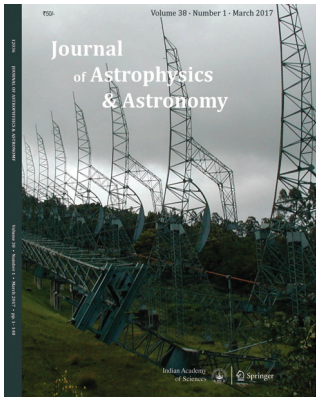
The international community is busy developing the so-called 'Key Science Projects' (KSPs), i.e. large scale collaborative projects addressing key scientific questions. Indian astronomers, too, are looking to build up their science cases so that they are in a position to play significant roles in the appropriate KSPs of interest. The first task along these lines was to prepare a set of articles highlighting the science areas which Indian scientists are interested

in, and also to provide initial plans for what they would want to do with the SKA. Various scientists have been working on preparing these science articles for quite some time now, and this Special Issue of the *Journal of Astrophysics and Astronomy* is essentially the collection of all such articles. As one will see, the issue contains articles covering a wide range of science areas, almost all areas that are being explored by the SKA international community. It is hoped that the present set of articles will provide a clear direction, both to the international as well as the Indian community, regarding the SKA-related science areas of current interest within India. It is also hoped that these articles will enthuse more astronomers to get involved with SKA, thus allowing the community to explore subjects beyond what has been covered in this issue.

The Ooty Radio Telescope

Editors: Jayaram N. Chengalur and Somnath Bharadwaj

Journal of Astrophysics and Astronomy
Volume 38, Issue 1, March 2017



Around half a century ago the Radio Astronomy Group at TIFR, under the leadership of Prof. Govind Swarup, embarked on an ambitious project to build a radio telescope at Ooty. This 530-m-long and 30-m-wide cylindrical parabolic reflector had a unique design that allowed it to track a source in the sky with a single rotation of the telescope along the long axis of the cylinder. In these four decades, several very significant scientific discoveries were made in observational cosmology, pulsars, recombination lines and the interstellar medium as well as the inner heliosphere. The Ooty Radio Telescope (ORT) continues to be in regular operation and is currently being used for space weather studies as well as pulsar observations.

The ORT is currently undergoing a major upgrade to its receiver chain, which will result in a new system called the Ooty Wide Field Array (OWFA). The OWFA is designed to function as a 264-element interferometric array, and to provide a significantly larger instantaneous bandwidth as well as field-of-view compared to the legacy ORT receiver system. In addition to significantly enhancing the capabilities for heliospheric studies, this upgrade is also expected to open other avenues of research particularly in the newly emerging areas of 21-cm intensity mapping and studies of transient radio sources. Articles in a Special Section of the March 2017 issue of the *Journal of Astrophysics and Astronomy* present the scientific motivation, design and expected capabilities of this upcoming instrument.

DISCUSSION MEETING

Foundations of Biology

23 – 26 February 2016
Orange County, Coorg

A Discussion Meeting on "Foundations of Biology" (the fourth in the series), supported by the Indian Academy of Sciences, Bengaluru, and organized by L S Shashidhara, A Joshi and S Dey, was held between 23-26 February 2017 at Orange County, Coorg. This series of meetings involved some focused seed-talks (one or two per session) and free-ranging discussions on foundational topics in biology, especially those relevant to ecology and evolution.

This edition of the meeting was attended by 22 participants from universities and research institutes across the country, including ecologists, evolutionary biologists, psychologists, geneticists, molecular biologists and physicists. The meeting consisted of 4 themed sessions, with 9 speakers: Sandeep Krishna, B. J. Rao, Analabha Basu, Sumanta Bagchi, Mahesh Sankaran, Deepak Barua, Amitabh Joshi, T. N. C. Vidya and Sutirth Dey.

Topics included the role of models and theory in biology; the use of concepts from physics in understanding biological systems at cellular, organismal and populational levels; the use of genomic data to infer human history and dispersal; climate change and eco-evolutionary dynamics in plant communities and ecosystems; and re-examining the conceptual foundations of evolutionary theory with an intent to unify microevolution, macroevolution and evolutionary developmental biology. The fifth session was an open session for discussion and synthesis. The meeting saw very animated and in-depth discussion and debate on these important foundational topics in biology and was highly intellectually stimulating.

PROMOTION OF ACADEMY JOURNALS

As part of promotion of the journals, the Academy participated and showcased the journals at the following conference and also awarded two best poster prizes:

1. Recent Advances in Operator Theory and Operator Algebras held at Indian Statistical Institute, Bengaluru, 13 – 22 December 2016.
2. Indian Science Congress 2017 held at Sri Venkateswara University, Tirupati, 3 – 7 January 2017.
3. MRSI Symposium 2017 held at Indian Institute of Technology, Mumbai, 13 – 15 February 2017.
4. 35th Annual Meeting of the Astronomical Society of India (ASI) held at Birla Institute of Scientific Research (BISR), Jaipur, 6 – 10 March 2017.

HINDI WORKSHOPS

The Indian Academy of Sciences and the Raman Research Institute jointly conducted Hindi Fortnight was jointly observed during 14-26 September 2016. Various competitions such as quizzes, story-telling, Hindi typing, knowledge of Administrative Glossary, Hindi dictation and Hindi songs were held. The fortnight concluded with Hindi Day Celebration on 26 September 2016. A lecture by Dr. Niru Sinha, Maharani Lakshmi Ammani College for Women, Bengaluru, was followed by prize distribution.

The following talks were held jointly by the Indian Academy of Sciences and the Raman Research Institute: Shri Srinivas Rao, Hindi Officer, Bharat Electronics Ltd, Bengaluru, spoke on "Hindi in Administrative and Technical field" on 23 December 2016. Dr. Durga Dutt Ozha, Former Senior Scientist-G, Ministry of Water Resources, Head of Chemical Laboratory, Rajasthan, and Member of Hindi Advisory Committee for promotion of Science, spoke on "Invisible pollution in environment, its hazards and remedial measures" on 17 March 2017.

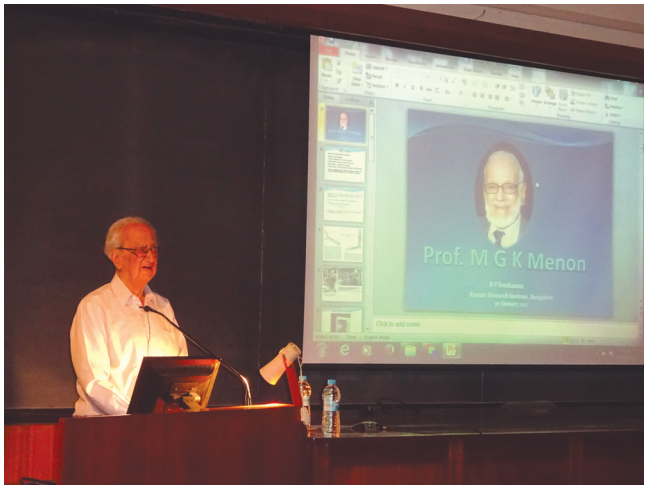
ACADEMY PUBLIC LECTURES

Remembrance – M.G. K. Menon

30 January 2017

Raman Research Institute, Bengaluru

On the 30th of January 2017, a gathering of Remembrance was held in the auditorium of Raman Research Institute (RRI) to mark the life and contributions of M. G. K. Menon, or Goku as he was fondly called. The speakers included Kasturirangan, B.V. Sreekantan, Jyotsna Dhawan, Roddam Narasimha and Vivek Radhakrishnan. Among the audience were other associates of Menon, and students and faculty



members of RRI and IASc. The event commenced on a poignant note as Vivek Radhakrishnan, secretary of the RRI Trust, spoke of his relationship with Menon, presenting a clear picture of the personal nature of the professor – a man filled with warmth and compassion.

Kasturirangan, recounted some of his own experiences with the professor, including some of his early encounters, and how Menon impressed him. He concluded his talk by saying 'He (Menon) always accepted the roles offered to him, never saying no, and in the process, he turned out to be one of the biggest assets for scientific promotion in this country in the post independent era.' The next speaker was Sreekantan whom Menon supposedly would refer to as his Guru. Sreekantan spoke mostly on the career highlights of Menon's life, referring to Menon's early work at the University of Bristol as being 'responsible for very important developments in particle physics.'

Jyotsna Dhawan, in her talk, stressed upon Menon's association with three other leaders – Rad Radhakrishnan, Sivaraj Ramaseshan and Satish Dhawan. The four men with their keen intellects, distinct interests and combined efforts 'made an indelible impact not only on this scientific institution but pretty much on every individual they encountered.' The last talk of the event was delivered by Roddam Narasimha, representing the Indian Academy of Sciences, who spoke of Menon's involvement with the Academy, and his contributions, which brought in new directions in the initiatives of the Academy.

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REPOSITORY OF SCIENTIFIC PUBLICATIONS OF ACADEMY FELLOWS

In 2009 and 2010 there were calls for Indian Academy of Sciences to set up a repository of publications of its Fellows. This was to be, at minimum, a collection of metadata records of Fellows' publications, of both its present and deceased Fellows.

During the year 2016-2017, the number of records (publications) added was 2425. Of these, 257 have full text. The total number of records with full text at the end of the period 2016-2017 was 21,145 out of 95,317 total records.

The Repository is at *http://repository.ias.ac.in*. Repository content can be viewed by year, by subject (sectional name), and by Fellow name (names as in Academy Year Book).

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'WOMEN IN SCIENCE' PANEL PROGRAMMES

Women in Science: A Career in Science

NMKRV College, Bengaluru
03 March 2017

This one-day lecture programme intended to address the issues of under representation of women at all levels of Science and Technology.

The programme started with the inaugural session followed by keynote address by G. C. Anupama, Dean, Indian Institute of Astrophysics, Bengaluru, who spoke on many jobs and research opportunities available for women in various fields. She talked about the women scientists who were behind the MANGALYAN Project, and added IIAP had more women than men.

Presidential remarks were given by M. K. Dattaraj, Trustee, RSS Trust, Bengaluru. The second lecture was on "Career in Science" by Akella Vani, Indian Institute of Horticultural Research, Bengaluru. This session focused on various career options in the physical and biological sciences. A number of statistical reports were presented for various career options available and also on how to get scholarships and other benefits available for women. There were many queries raised by the students during this session.

The third lecture was on "Education, Science, Technology and Empowerment of Women: Emerging Scenario" by Latha Christie, Ministry of Defense, Bengaluru. She made a point that women not only needed societal support to progress in scientific and engineering fields, they also needed to feel that their endeavours had a beneficial impact on the society to provide them with an incentive to excel their chosen areas.

The last lecture was on "Renewable Energy Technologies and their Applications" by Sheela K Ramasesha, Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru. She spoke in detail about the various renewable energies available and also mentioned the technologies to use in the beneficiary manner so that the future generation can live better in this world.

Women in Science: A Career in Science

The National College, Bengaluru
14 March 2017

This one-day seminar on was organized on the occasion of International Women's Day for the faculty and undergraduate students at The National College, Bengaluru (NCB).

H. S. Savithri, Department of Biochemistry, Indian Institute of Science, Bengaluru, in her keynote address spoke about the challenges faced by women in building their career in science. She spoke about the activities of the Academy Panel on "Women in Science" and other programs of Indian Academy of Sciences. The first lecture, "My journey into the wonderland of viruses", explaining how viral DNA replicates using enzyme system of the host and their proliferation, followed.

The second lecture was on "Making Satellite and Women in ISRO" by Vasantha Kumari, ISRO Satellite Centre, Bengaluru. She spoke on the application of space technology for benefit of the common man which may be in the field of satellite communication and remote

sensing in village areas under which telemedicine project to connect remote areas for proper and advanced medication is used. She concluded the talk by saying about 30% of the total staff in ISRO were women. India has the capability to build space crafts and made clear that selection of candidates for ISRO is purely on merit basis.

The third speaker, Shivaleela, Department of Nutrition, University of Agricultural Sciences, Bengaluru, spoke on “Women in agriculture and science”. She highlighted the various aspects production of pulses and cereals and how women work in field and at home balancing the workplace and the family.

Shobhana Narasimhan Theoretical Sciences Unit, JNCASR, Bengaluru, addressed the gathering “The many body problem in academia and physics”, in which she demonstrated the conditions of women in India and the World. She spoke on the many body problem concept of physics through her excellent communication aspect.

Paulami, NIMHANS, Bengaluru, spoke on “Women and psychology”. She spoke on the impact of family life on research career, absence of clear career path, gender bias, gender schemas and unconscious bias, the need for support and inspirational models, reconstruction of the academic research system etc. She highlighted that there is a lot of interest in under-representation of women in certain sciences, but in the field of psychology, there is more concern about the lack of men.

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VIGILANCE AWARENESS WEEK

The 'Vigilance Awareness Week' was observed at the Indian Academy of Sciences between 31 October and 5 November 2016, under the aegis of the Central Vigilance Commission. The theme of the 'Vigilance Awareness Week' this year was 'Public participation in promoting integrity and eradicating corruption'. In this context, a special lecture by Shri M N Vidyashankar was organised jointly by the Indian Academy of Sciences and Raman Research Institute, on the 4 November, 2016. Shri M N Vidyashankar has over 30 years of rich experience in management and administration of various government bodies, boards and corporations, having served in various government departments at the state and central level and most recently as the Additional Chief Secretary to the Government of Karnataka.

His talk, titled "Corruption: The Curse In An Economy", commenced with a series of examples – citing substantive statistical data and documented figures – illustrating how corruption is detrimental to the socio-economic development of our nation. The speaker spoke about the challenges faced in dealing with corruption, portraying a picture of a sociopathic system of governance, a relatively immune upper-class, a despondent middle-class and a below-the-poverty-line class, whose population, "theoretically", only increases every year, despite the employment of various measures to combat poverty. Shri M N Vidyashankar concluded his talk by pointing out that we, as a society, and not as individuals, have the solution to every problem, but the challenge lies in the implementation. The question then, he says, is – Do we have the mindset to solve it?

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SUMMER RESEARCH FELLOWSHIP PROGRAMME FOR STUDENTS AND TEACHERS – 2017

The Summer Research Fellowship Programme which is jointly conducted by the three National Science Academies of the country is in its Eleventh year.

The announcement for the 2017 Programme was released in September 2016 and the last date for receipt of applications was 30 November 2016. Selection Committees in six disciplines met during the third week of December 2016 to scrutinize and make selections. The following table indicates the numbers of applications received from students and teachers and the subject-wise shortlist.

Subjects	No. of applications received		Shortlisted for selection	
	Students	Teachers	Students	Teachers
Life Sciences	4030	179	559	078
Engineering & Technology	8199	169	668	031
Chemistry	2040	112	324	019
Physics	2199	069	289	030
Earth & Planetary Sciences	981	012	166	004
Mathematics	920	038	149	014
TOTAL	**18369**	**579**	**2155**	**176**
GRAND TOTAL	**18948**		**2331**	

The next issue of *Patrika* will include the number of fellowships offered, those actually availed and some analysis of the data.

REFRESHER COURSES AND LECTURE WORKSHOPS

Jointly conducted by IASc (Bengaluru), INSA (New Delhi) and NASI (Allahabad)

REFRESHER COURSES

Two-week Refresher Courses are aimed at helping teachers to add value to their teaching and are designed to have direct relevance to the study materials covered in the graduate and undergraduate syllabi followed in universities and institutions in the country. The following courses were held from April to September 2016.

A. Refresher Courses in Experimental Physics

The Refresher Courses in Experimental Physics were held under the direction of R Srinivasan, who was instrumental in the conceptualisation and designing of the experiments. He has so far held 79 Courses in different parts of the country since 1999. These experiments are useful for 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 manufactured under licence by M/s Ajay Sensors and Instruments, Bengaluru.

The following is the list of Experimental Physics Courses held from October 2016 to March 2017. Complete information is provided in our website.

Title	Venue	Duration	Director	Coordinator
Experimental Physics (For Utkal University teachers) – 85	IASc, Bengaluru	10–03-2017 – 25-03-2017	C.S. Sundar	T.D. Mahabaleswara
Experimental Physics – 84	St. Philominas College, Mysore	14-02-2017 – 01-03-2017	R. Srinivasan	D. Revannasiddaiah
Experimental Physics – 83	Mody University of Science and Technology, Sikar	29-12-2016 – 13-01-2017	R. Srinivasan	Brijraj Singh
Experimental Physics – 82	Kakatiya University, Warangal	06-12-2016 – 21-12-2016	R. Srinivasan	A.S. Nageswara Rao
Experimental Physics – 81	Goa University, Goa	03-11-2016 – 18-11-2016	K.R. Priolkar	K.R. Priolkar
Experimental Physics – 80	Government Holkar Science College, Indore	13-10-2016 – 28-10-2016	R. Srinivasan	R.C. Dixit

B. Other Refresher Courses

The following is the list of Refresher Courses in Other Topics held from April to September 2016. Complete information is provided in our website.

Title	Venue	Duration	Director	Coordinator
Genetics and Molecular Biology	IISc, Bengaluru	16-01-2017 – 29-01-2017	Umesh Varshney	H.A. Ranganath and Soumitra Das
Advanced quantum mechanics	Government Arts College, Melur	12-12-2016 – 24-12-2016	G. Rajasekaran	A. John Peter
Immunology laboratory techniques using fish model	Vels University, Chennai	05-12-2016 – 17-12-2016	V.R. Muthukaruppan	R. Dinakaran Michael
Quantum Mechanics	B.S. Abdur Rahman University, Chennai	28-11-2016 – 10-12-2016	H.S. Mani	G.V. Vijayaraghavan
Materials Preparation and Measurement of Properties	IASc, Bengaluru	15-11-2016 – 30-11-2016	T.G. Ramesh	T.D. Mahabaleswara
Experimental Biology: Orthodox to Modern	St. Joseph's College, Tiruchirappalli	07-11-2016 – 19-11-2016	D.J. Bagyaraj	T. Francis Xavier
Mathematical methods in physics and its applications	University of Mumbai, Mumbai	17-10-2016 – 29-10-2016	Amita Das	Anuradha Misra

LECTURE WORKSHOPS

The following is the list of Lecture Workshops held from April to September 2016. Complete information is provided in our website.

Title	Venue	Duration	Director	Coordinator
Shock waves in science, engineering and medicine	Bengaluru Institute of Technology, Bengaluru	24-03-2017–25-03-2017	E. Arunan	D. Nagaraja
Algebra and Geometry	Central University of Jammu, Jammu	23-03-2017–24-03-2017	K.H. Paranjape	Pavinder Singh
Recent trends in nanomaterials	Vijaya College, Bengaluru	22-03-2017–23-03-2017	S. Natarajan	K.C. Radha
Recent developments in applied physics	Khadir Mohideen College, Adirampattinam	18-03-2017–19-03-2017	K. Porsezian	A. Ayeshamariam
Some modern aspects on Chemistry	Gangarampur College, Dakshin Dinajpur	16-03-2017–17-03-2017	Samaresh Bhattacharya	Sajal Sarkar
Organic Chemistry from Bench to Industry	NMKRV College for Women, Bengaluru	14-03-2017–15-03-2017	N. Jayaraman	Y. Venkataramanappa
Biodiversity for sustainable development	Kakojan College, Jorhat	13-03-2017–14-03-2017	S.K. Saidapur	Babita Phukan Borkotoky
Fundamentals of Chemistry	Ramakrishna Mission Vivekananda Centenary College, Rahara	10-03-2017–11-03-2017	Uday Miatra	Chandrakanta Bandyopadhyay
Recent advances in biological sciences	Nandha Arts and Science College, Erode	09-03-2017–10-03-2017	D.J. Bagyaraj	K. Abdhul
Recent trends in biological sciences	University of Calicut, Calicut	09-03-2017–10-03-2017	Sathees C. Raghavan	M. Nasser
Applications of Differential Equations in Engineering and Biology	Sri Venkateswara University, Tirupati	09-03-2017–11-03-2017	P. Kandaswamy	S. Sreenadh
Emerging trends in chemical sciences	Lady Doak College, Madurai	09-03-2017–01-03-2017	M. Palaniandavar	S. Vasantha
Recent trends in Biochemistry and Biotechnology	Sri Venkateswara University, Tirupati	08-03-2017–09-03-2017	P. Kondaiah	Balaji Meriga
Energy Materials	Christ University, Bengaluru	08-03-2017–09-03-2017	K. S. Narayan	Sreeja P.B.
Plant taxonomy: morphology to molecular approach	Vivekananda College of Arts and Science for Women, Tiruchengode	07-03-2017–08-03-2017	R.R. Rao	M. Senthilkumar
Analysis and Probability	Vijaya College, Bengaluru	06-03-2017–07-03-2017	Gadadhar Mishra	M.S. Nagashree
Genetics To-Day	St. Xaviers College, Palayamkottai	06-03-2017–07-03-2017	H.A. Ranganath	Maria Sebastian
Current trends in natural resources and its prospecting	Kumudvathi First Grade College, Shimoga	03-03-2017–04-03-2017	R. Uma Shaanker	Vinayaka K.S.
Recent trends in chemistry and biology	Mrinalini Datta Mahavidyapith, Kolkata	03-03-2017–05-03-2017	P.K. Das	Debashis Mallick
Advances in supramolecular chemistry and nanoscience	St. Joseph's College, Irinjalikuda	03-03-2017–04-03-2017	K. George Thomas	Jessy Emmanuel
Topology in condensed matter physics	SDM College, Ujire	02-03-2017–03-03-2017	Chandan Dasgupta	Chetan Rao

Title	Venue	Duration	Director	Coordinator
Chemistry-Current Focus	A.V.C. Collge, Mayiladuthurai	27-02-2017–28-02-2017	V. Subramanian	G. Selvanathan
Emerging trends in material Science	Government Arts College, Tiruvannamalai	25-02-2017–26-02-2017	K. Porsezian	R. Ravisankar
Emerging trends in physics	NGM College, Pollachi	24-02-2017–25-02-2017	K. Porsezian	R. Kanakaraju
Recent trends in comparative reproductive endocrinology	Chinmaya Arts and Science College for Women, Kannur	24-02-2017–25-02-2017	T. Subramoniam	P.A. Valsalakumari
Hyperbolic partial differential equation (HPDE) and conservation laws (CL)	NEHU, Shillong	22-02-2017–25-02-2017	Phoolan Prasad	Jibitesh Dutta
Condensed and soft matter physics	Mangalore University, Mangalore	22-02-2017–24-02-2017	K.A. Suresh	Yerol Narayana
Big data analytics	S.N.R. Sons College, Coimbatore	22-02-2017–23-02-2017	R. Krishnan	S. Gomathi
Advances in Cancer Biology	Vijaya College, Bengaluru	22-02-2017–23-02-2017	Sathees C. Raghavan	P.S. Sastry
Progress in understanding of disease biology	Christ University, Bengaluru	22-02-2017–23-02-2017	Dipshika Chakravortty	Suma S.
Emerging trends in chemistry	Saldiha College, Bankura	17-02-2017–18-02-2017	Uday Maitra	Samir Kumar Mandal
New horizons in biology	S.V. University, Tirupati	16-02-2017–17-02-2017	H.A. Ranganath	Sathyavelu K. Reddy
Fourier analysis and applications	Sri Bhagvan Mahavir Jain College,	16-02-2017–17-02-2017	Kaushal Verma	J. V. Ramana Raju
Recent trends in biodiversity and its conservation	Sri KGS Arts College, Thoothukudi	15-02-2017–16-02-2017	D.J. Bagyaraj	K. Petchimuthu
Recent advances in physics	St. Xaviers College, Kolkata	10-02-2017–11-02-2017	D.N. Bose	Subhankar Ghosh
Thrust areas in biological sciences – BIOTAB 2017	Seethalakshmi Ramaswami College, Tiruchirapalli	09-02-2017–10-02-2017	S.K. Saidapur	A.S. Maheswari
Recent developments in applied physics	Devanga Arts College, Aruppukottai	09-02-2017–10-02-2017	K. Porsezian	B. Ravi Kumar
Biodiversity and bioresources: conservation and utilization	Government Arts College, Karur	08-02-2017–10-02-2017	R.R. Rao	M. Kandhasamy
Mathematical Biology	PSG College of Arts and Science, Coimbatore	08-02-2017–10-02-2017	P. Kandaswamy	A. Anguraj
Modern trends in Zoology and Agriculture Microbiology	Saiva Bhanu Kshatriya College, Aruppukottai	07-02-2017–08-02-2017	T.J. Pandian	Bakavathiappan
Advances in particle physics	Periyar EVR College, Tiruchirappalli	06-02-2017–07-02-2017	G. Rajasekaran	P. Ramesh Kumar
Innovations and Reserch in Biology	Hindustan College of Arts and Science, Coimbatore	02-02-2017–03-02-2017	D.J.Bagyaraj	Lali Growther
Glimpses on plant sciences	Nirmala College, Coimbatore	02-02-2017–03-02-2017	R.R. Rao	R. Mary Josephine
Molecular machines	Maharaja's College, Ernakulam	02-02-2017–03-02-2017	M.S. Gopinathan	Maya K.S.

Title	Venue	Duration	Director	Coordinator
Proteins in drug discovery and design	Maharani's Science College for Women, Bengaluru	01-02-2017–02-02-2017	Savithri H.S.	Asma Saqib
Recent advances in botany and microbiology research	PSGR Krishnammal College for Women, Coimbatore	31-01-2017–01-02-2017	D.J. Bagyaraj	B. Chitra Devi
Plant Taxonomy	Bapuji Institute of Engineering & Technology, Davangare	27-01-2017–28-01-2017	M. Sanjappa	B.E. Rangaswamy
Perspectives in biological research	AVC College, Mannampandal	23-01-2017–24-01-2017	R.R. Rao	G. Amalan Robert
Plant diversity and its conservation	Narendra Degree and PG College, Armoor	23-01-2017–24-01-2017	M. Sanjappa	A. Rajendra Kumar
Modern chemistry and biology	Aurora's Degree & PG College, Hyderabad	20-01-2017–21-01-2017	Rajan Sankaranarayanan	KMR Nambiar
Introduction to modern biology	The American College, Madurai	19-01-2017 –21-01-2017	T.J. Pandian	K. Navaneethakannan
Recent perspectives in computational and experimental chemistry	Uday Pratap College, Varanasi	17-01-2017–19-01-2017	M.S. Singh	Ashutosh Gupta
Frontiers in life sciences	Nehru Memorial College, Puthanampatti	17-01-2017–18-01-2017	R.R. Rao	Boopathy Raja
Biotechnology, bioprospecting and conservation of bioresources	St. Joseph's College, Bengaluru	12-01-2017–13-01-2017	K.N. Ganeshiah	Grace Prabhakar
Emerging trends in applied physics	Tagore Arts College, Puducherry	10-01-2017–11-01-2017	K. Porsezian	S. Santhosh Kumar
Recent developments in chemistry	Avinashilingam Institute of Home Science and Higher Education, Coimbatore	09-01-2017–10-01-2017	Ramaraj. R.	S. Subhashini
An overview of undergraduate mathematics and research opportunities	National College, Bengaluru	06-01-2017–07-01-2017	Gadadhar Misra	K.S. Gayathri
Frontiers in material science	Ravenshaw University, Cuttack	06-01-2017–07-01-2017	Ashok Kumar Mishra	Alekha Kumar Sutar
Recent developments in chemistry	K.S.R. College of Arts & Science for Women, Trichengode	06-01-2017–07-01-2017	Vijayamohanan K. Pillai	Jothimani S.
Floristic diversity and its conservation	Vivekananda College, Tiruchengode	05-01-2017–07-01-2017	D.J. Bagyaraj	R. Prabakaran
Computational quantum chemistry	Sacred Heart College, Thevara	05-01-2017–07-01-2017	E.D. Jemmis	Abi T.G.
Scope on nonlinear Physics	Fatima College, Madurai	05-01-2017–06-01-2017	K. Porsezian	Ancemma Joseph
Algebra and analysis	Karpagam University, Coimbatore	04-01-2017–05-01-2017	K.N. Raghavan	M. Jeganathan
Emerging trends in material science	Raja Doraisingam Government Arts College, Sivakasi	03-01-2017–04-01-2017	K. Porsezian	B. Natarajan
Current scenario in plant sciences	V.O. Chidambaram College, Tuticorin	28-12-2016–29-12-2016	D.J. Bagyaraj	V.R. Mohan

Title	Venue	Duration	Director	Coordinator
Mathematical Modelling	PSGRK College for Women, Coimbatore	21-12-2016–23-12-2016	P. Kandaswamy	K. Sumathi
Impact of life sciences in 21st century	PSGRK College for Women, Coimbatore	20-12-2016–21-12-2016	Sathees C. Raghavan	Susheela P.
Recent advances in plant taxonomy and conservation biology	Government College, Kurnool	16-12-2016–17-12-2016	R.R. Rao	K.V. Madhusudan
Prospects in biosciences	Bharathiar University, Coimbatore	15-12-2016–16-12-2016	R.M. Pitchappan	S. Suja
Lecture Workshop on Physics, Chemistry and Mathematics	Dayananda Science College, Latur	10-12-2016 –12-12-2016	A.P. Pathak	R.H. Ladda
Emerging vistas in plant sciences	Alvas College, Moodbidri	29-11-2016–30-11-2016	R.R. Rao	Sukesh
Basics of relativistic quantum mechanics and field theory	Bishop Moore College, Mavelikara	29-11-2016–01-12-2016	M. Lakshmanan	Javeesh Alex
Recent trends in biodiversity conservation	Government Victoria College, Palakkad	16-11-2016–17-11-2016	R.R. Rao	Sojan Jose
Trends in nanoscience and functional genomics	MES College, Aluva	15-11-2016–16-11-2016	E. Vijayan	Umesh B.T.
Emerging trends in chemical sciences	Tezpur University, Sontipur	11-11-2016–13-11-2016	M. Palaniandavar	Nashreen S. Islam
Modern chemistry and biology	NKL Khan Womens College, Midnapore	05-11-2016–07-11-2016	P.K. Das	Dilip K. Nandi
Plant Taxonomy – Aims and Perspectives	University College for Women, Hyderabad	02-11-2016–03-11-2016	R.R. Rao	I. Sobha Rani
Recent developments in chemistry	Scott Christian College, Nagercoil	21-10-2016–22-10-2016	R. Ramaraj	G. Allen Gnana Raj
Computational fluid dynamics	Kuvempu University, Shimoga	21-10-2016–22-10-2016	P. Kandaswamy	B.J. Gireesha
Proteomics for health diseases	BMS College for Engineering, Bengaluru	21-10-2016–22-10-2016	Utpal Tatu	Rajya Lakshmi
Magnetic and Optical Phenomena in molecular materials, principles and applications	Tezpur University, Tezpur	19-10-2016–21-10-2016	S. Ramasesha	Nayanmoni Gogoi
Groups in geometry and applications	Maitreyi College, New Delhi	13-10-2016–15-10-2016	Ajit Iqbal Singh	Geetan Manchanda
Recent trends in biological research: health and disease perspective	Mangalore University, Mangalore	07-10-2016–08-10-2016	K. Thangaraj	M.S. Mustak
Progress and challenges in life sciences	PSG College of Arts and Science, Coimbatore	06-10-2016–07-10-2016	T.J. Pandian	D. Brindha
Biodiversity and biotechnology	Srimad Andavan Arts & Science College, Tiruchirappalli	06-10-2016–07-10-2016	R.R. Rao	P. Thirumalai Vasan
Properties and prospects in biosciences	St. Josephs College, Tiruchirappalli	04-10-2016–05-10-2016	R.R. Rao	A. Auxilia
Tissue culture techniques in biotech industries	KSR College of Technology, Tiruchengode	03-10-2016–05-10-2016	E. Vijayan	P. Ponmurugan
Bridging the learning gap in Chemistry from concepts to applications	Sir Parashurambhau College, Pune	01-10-2016–03-10-2016	K.N. Ganesh	Vidya Avasare

NATIONAL SCIENCE DAY

February 28th is celebrated as National Science Day in India, a day when the nation commemorates the genius of Sir C V Raman and celebrates the spirit of science through a plethora of activities ranging from seminars, debates, quiz competitions, exhibitions and lectures involving college and school students, teachers and researchers.

Organized by the National Council for Science & Technology Communication Programmes, activities this year focused on "Science and Technology for Specially Abled Persons". The Indian Academy of Sciences every year hosts an exclusive National Science Day event for students.

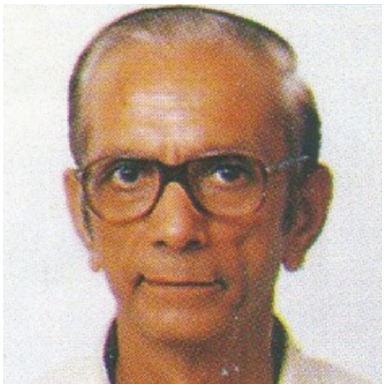
This year, school students from various parts of Bangalore visited the renowned Sir C V Raman Museum located in the Raman Research Institute. The museum houses Raman's prized collection of gems, crystals, minerals, and rock specimens from all over the world.

Raman was a strong believer of learning from experimenting and observing. Bringing the same spirit of experimentation and observation to the students was the 'Hands-on Session', by the Agasthya Foundation. The session focused on ingeniously designed yet simple set-ups and experiments to learn the natural principles that govern everyday life. The occasion also saw the screening of the inspiring documentary on Raman's life.

The coming years are likely to see large-scale use of drones to deliver specialized services ranging from healthcare in remote areas and search-and-rescue operations to security and surveillance and even scientific data collection. To give students a flavor of the future, scholars from the Aerospace Engineering Department of IISc demonstrated their drone technology while describing their mechanisms and applications.

The Science Day Talk by Shri H R Madhusudan, Jawaharlal Nehru Planetarium, explored the concepts of isoperimetric problems – how circles with the same perimeter of a square will have larger area, and how such shapes in nature are optimized for energy minimization.

OBITUARIES



Nakra, Bahadur Chand
(Elected 1995)

Bahadur Chand Nakra died on 12 April 2016 at Gurgaon, after a brief illness. He is survived by two sons. Born on 31 March 1939 in Mianwali, now in Pakistan, Nakra earned his BSc Engg (Hons.) in 1959 from the Punjab University, M Tech in 1961 from IIT Kharagpur and PhD in 1966 from the Imperial College of Science and Technology, London, working with P. Grootenhuis on vibration control of structures and machines using viscoelastic damping. Nakra joined IIT Delhi as an Assistant Professor in 1966. Here he mentored 21 PhD students, supervised over 60 MTech projects, authored more than 160 research papers including 96 in peerreviewed journals, 3 books and about 70 technical reports for sponsored R&D work from leading industrial and government undertakings in power, automotive, railways, process and manufacturing sectors.

His books *Theory and Applications of Automatic Control and Instrumentation, Measurement and Analysis* with K. K. Chaudhry are popular among students and researchers. He was conferred with the C. V. Raman Award by the Acoustical Society of India (1995); Eminent Engineer Award (2002) by the Institution of Engineers, India; Distinguished Mechanical Engineering Educator Award by ISME (2005); and INSA-GP Chatterjee Memorial Award (2001). He was elected to the fellowship of Indian National Science Academy (1987), Indian National Academy of Engineering (1987), Indian Academy of Sciences (1995), National Academy of Sciences (India) (1995), and the Third World Academy of Sciences (2002).

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Ramamurti, Viswanatha
(Elected 2010)

Ramamurti earned his M Tech from IIT Kharagpur in 1963, worked for KCP Limited, Madras from 1963 to 1966 and then joined IIT/M as Lecturer.

He received his Ph D in 1970 from IIT/M and was promoted to Assistant Professorship. He became a professor in 1977 and retired in 2001.

He also chaired the Department of Applied Mechanics from 1978 to 1981. Ramamurti also made substantial contributions to the IIT/M Senate proceedings, evincing commitment to academics. He continued to be academically active even after his retirement from IIT/M.

Ramamurti was decorated with several awards and honours which include NRC Senior Research Award of NASA, USA to work at the NASA Lewis Research Centre, Cleveland (1981).

He was elected Fellow of the Indian National Academy of Engineering (1989), Indian National Science Academy (1990) and Indian Academy of Sciences (2010); the Syed Husain Zaheer Medal (1995); Honorary Life Member, Association of Machines and Mechanisms (1996); INSA Biren Roy Award (2007), and Distinguished Alumnus Award of IIT Kharagpur (2012).

Pal, Manoj Kumar
(Elected 1974)

Manoj Kumar Pal, Internationally recognized Nuclear Theorist, passed away at his Kolkata Residence on 3 March 2016. He joined Saha Institute of Nuclear Physics (SINP) and did his Post M Sc (1953- 54 batch) and got his Ph D in 1959 working in theoretical nuclear physics. He joined the faculty of Saha Institute of Nuclear Physics in 1960 and rose to the position of full Professor in 1969 and Senior Professor in 1981.

He became the Director of this institute in 1983 and continued in this position till his retirement in 1992, there upon he served as Emeritus Scientist of CSIR, Government of India till 1997. He held visiting Scientist/ Professor positions in many reputed institutes and universities abroad. Based on his research, he wrote an advanced textbook entitled *Theory of Nuclear Structure* which is widely used in universities and research institutes in India and abroad. He was a fellow of the Indian National Science Academy, Delhi and fellow of the Indian Academy of Sciences, Bengaluru.

He was a recipient of M. N. Saha Gold Medal from the Asiatic Society in Calcutta. He was chosen as the Co-Director of the International Workshops/Schools in Nuclear Physics at ICTP, Trieste, Italy He published two books, one on *Special Theory of Relativity and other on General Theory of Relativity* after retirement.

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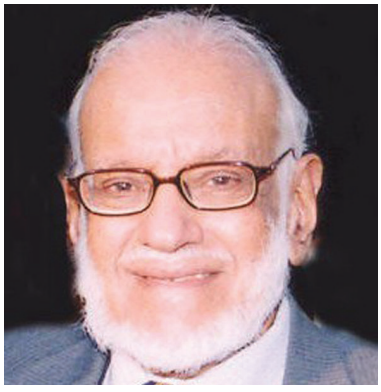

Menon, Mambillikalathil Govind Kumar
(Elected 1964)

Council Service: 1968-85
Vice-President: 1971-73
President: 1974-76

During the morning hours on Tuesday, 22 November 2016 Mambillikalathil Govind Kumar Menon passed away at his residence in New Delhi. After holding his PhD and postdoctoral fellowships in the United Kingdom for three years, Menon joined TIFR, Bombay, at the invitation of Bhabha and integrated himself effectively with the research groups working in the field of cosmic rays.

He was appointed in 1974 as the Scientific Advisor to the Defense Minister with a charge to serve also as the Director, Defence Research and Development Organization.

In 1978 he was appointed as the Secretary, Department of Science and Technology, Director General Council of Scientific & Industrial Research, and subsequently as a member of the Planning Commission (1982-89), which accorded him an opportunity to draft the Technology Policy Statement (1983) and play a wider role in the national development. He was the Chairman, Scientific Advisory Committee to the Cabinet (1982-85) and Scientific Advisor to the Prime Minister (1986- 89). He served as the Union Minister for Science & Technology and for Education for a year before he was elected to the Rajya Sabha in 1990 for a six-year term.

Somayajulu,
Bhamidipati Lakshmidhara Kanakadri
(Elected 1980)

Born on 5 March 1937 in Visakhapatnam, a coastal town in Andhra Pradesh, India, he got his B Sc (Honors) in Chemistry from Andhra University in 1956. He worked for two years as a Demonstrator, teaching chemistry at Mrs A.V.N. College at Visakhapatnam, prior to joining Bhabha Atomic Research Center's (BARC) Training School in Bombay (presently Mumbai).

After a year's stint at BARC, Soma joined the Geophysics Group at the Tata Institute of Fundamental Research (TIFR) in Mumbai. He worked at TIFR closely with late Devendra Lal for 14 years (1959-73). When Lal moved his group from TIFR to Physical Research Laboratory (PRL) in 1972-73, Soma joined the group shortly after his return from the United States.

He served as the Chairman of the Geocosmo Physics Group during 1974-75 and 1980-1982. He became a full Professor at PRL in 1983. He officially retired from PRL in 1997 and continued his active research until 2003. He was a recipient of the prestigious Shanti Swarup Bhatnagar Award in Earth Sciences in 1978 for notable and outstanding research contributions. He was also the recipient of Shri Hari Om Ashram Prerit Shri Chunilal Vajeram Reshamwala Trust Research Award in Oceanology in 1981. Soma was elected as a Fellow of the American Geophysical Union in 2003 and Geochemical Society in 2004. He was also an elected fellow of the Indian Academy of Sciences (Bengaluru) and Indian National Science Academy (New Delhi).

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Sharma, Vijay Kumar
(Elected 2012)

Vijay Kumar Sharma, passed away in Bengaluru on the morning of 24 October 2016 at a young age of 49 years. After completing his PhD in 1997, Sharma joined the Evolutionary and Organismal Biology Unit of JNCASR as a Fellow in 1998, subsequently became a Faculty Fellow in 1999, Associate Professor in 2005 and full Professor in 2011.

He had also been a visiting scholar/ professor at several institutions abroad, Vijay Sharma was awarded the INSA Young Scientist Medal in 1998 and was selected as a Young Associate of the Indian Academy of Sciences (IAS, Bengaluru) from 1998 to 2002.

He received the A.K. Bose Memorial Award of the Indian National Science Academy (INSA, New Delhi) in 2001 and C.N.R. Rao Oration Award in 2010. In recognition of his contribution to science, Sharma was elected Fellow of IAS in 2012 and INSA in 2013. He served as a member of the Editorial Board of the *Journal of Circadian Rhythms, Journal of Genetics* and *Current Science*.

He was a reviewer for several highly reputed journals. He also served as a member of the Programme Advisory Committee in Animal Sciences of the Science and Engineering Research Board (SERB). Sharma was also actively involved in training students and teachers in SERB schools on chronobiology and insect biology. He delivered over a 100 invited talks at various symposia/conferences in India and in several other countries.

Thathachar, Mandayam Anandampillai Lakshmi
(Elected 1987)

Mandayam Ananthampillai Lakshmi Thathachar passed away on 7 January 2017 at his home in Bengaluru. Spent most of his academic career at the Indian Institute of Science (IISc), Bengaluru. Over a timespan of nearly four decades, he initiated and nurtured research at IISc in the then emerging areas of adaptive control, pattern recognition and machine learning, which are areas of utmost importance in industry today.

In 1964, he rejoined IISc as a lecturer in the Department of Electrical Engineering and obtained his Ph D from the same Department in 1968. He became a full professor at IISc at a relatively young age of 39 years and retired from service in 2001. He co-authored, along with K. S. Narendra (Yale University) a book entitled *Learning Automata*, the first one in the field.

He later co-authored another book, *Networks of Learning Automata*. Thathachar received many accolades and awards in recognition of his research work. He is among the first few researchers from India to be elected Fellow of the Institution of Electrical and Electronics Engineers (IEEE).

He was a Fellow of the Indian National Academy of Engineering, the Indian Academy of Sciences and the Indian National Science Academy. He received the Alumni Award for Excellence in Research at IISc and was also honoured with the prestigious Distinguished Alumnus Award of IISc.

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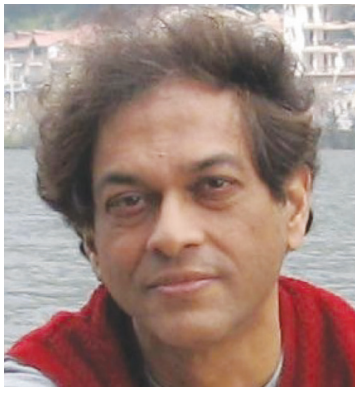

Kundu, Anjan
(Elected 2015)

On 31 December 2016, India lost one of its finest mathematical physicists, Professor Anjan Kundu, who breathed his last during a visit to Bengaluru. At the Patrice Lumumba University under the supervision of Yuri Petrovich Rybakov, Kundu worked on soliton solutions in field models with topological charge and obtained his Ph D degree in 1981.

He pursued his postdoctoral research in USSR during 1981-83, at the Joint Institute of Nuclear Research, Dubna. Kundu returned to India in 1983 and joined as a lecturer in physics at the Birla Institute of Technology, Pilani, and later worked for a brief period as a CSIR pool officer at Jadavpur University, Kolkata.

In 1986, he joined as a faculty member at the Saha Institute of Nuclear Physics (SINP), Kolkata, where he ultimately became a senior professor in 2009 and superannuated in 2012, but continued on extension till the end.

Kundu was recipient of many honours. Apart from the ones mentioned above, he was elected to the Fellowship of the Indian National Science Academy, New Delhi (2014) and Indian Academy of Sciences, Bengaluru (2015). He was a member of the Editorial Board of the *Proceedings of the Royal Society of London, Series A* since 2012. He has trained several outstanding students at SINP and published over 100 papers besides several articles to Proceedings and editing important books.

Vishveshwara, C.V.
(Elected 1977)

C. V. Vishveshwara is mainly associated with quasi-normal modes or the ringdown of a black hole. The prediction that his simple calculations made was dramatically verified after 46 years with the discovery of gravitational waves by LIGO, which was almost a year before he breathed his last on 16 January 2017 in Bengaluru. Vishu was the pioneer who explored how black holes respond when externally perturbed and proved that regardless of the perturbation, Schwarzschild black holes get rid of any deformation imparted to them by radiating gravitational waves with a frequency and decay time that depended only on their mass. These characteristic waves are technically termed quasi-normal modes, which is why after the announcement of the gravitational wave detection by LIGO, Vishu laid claim to the nom de plume 'quasimodo of black holes'. In 1968 Vishu got his Ph D from the University of Maryland. His thesis advisor was C. W. Misner. Vishu returned to Bengaluru in 1976 and joined the Raman Research Institute (RRI). In December 1992, he moved from RRI to the Indian Institute of Astrophysics (IIA), Bengaluru as a senior professor, from where he retired in 2005.

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Roy, Durga Prasad
(Elected 1987)

Durga Prasad Roy passed away on 17 March 2017 in Cuttack, Odisha after a brief illness. He obtained his Ph D degree in 1966 from the Tata Institute of Fundamental Research (TIFR), Mumbai, in particle physics. He was a postdoctoral Fellow at the University of California, Riverside, USA (1966-68); CERN, Geneva (1968- 69), and University of Toronto, Canada (1969-70). He then worked at the Rutherford Laboratory, UK (1970-74), and as Reader at Visva-Bharati University, Santiniketan, West Bengal (1974-76). He then joined TIFR as Reader in 1976 and retired as Senior Professor in 2006. He worked at the Homi Bhabha Centre of Science Education (HBCSE), TIFR, as a DAE Raja Ramanna Fellow (until 2011), and then continued working at HBCSE as an INSA Senior Scientist. Roy made pioneering contributions in the wide area of particle and astroparticle physics. Roy's scientific achievements were recognized in the form of Meghnad Saha Award conferred by UGC, New Delhi and the S. N. Bose Medal awarded by Indian National Science Academy (INSA), New Delhi (2007). He was elected Fellow of the Indian Academy of Sciences, Bengaluru (1987), INSA (1993) and the National Academy of Sciences (India), Allahabad (1997).

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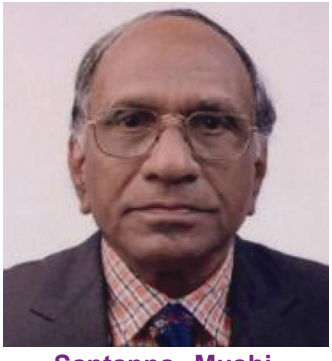

Santappa, Mushi
(Elected 1961)

With the passing of Prof. Mushi Santappa on 26 February 2017 at the age of 93, we have lost a chemist of distinction and leader in macromolecular sciences in the country. He along with Santi Rangan Palit at the Indian Association for the Cultivation of Science, could be regarded as the creator of the first rigorous research schools for polymer science in India. He obtained Ph D (1949) from University of London in Organic Chemistry and a second Ph D from University of Manchester in 1951. He worked with M. G. Evans, FRS, a pioneer in photoinduced polymerization of vinyl monomers for his

second Ph D. He returned to India in 1952 and joined as Reader in the University of Madras and became a Professor at the Madurai Extension Centre in 1958 and Head of the Physical Chemistry Department of University of Madras in 1962. He served as Senior Professor during 1966-80. The Society of Polymer Science, India has named an award after Santappa as a tribute to his contributions to the knowledge domain.

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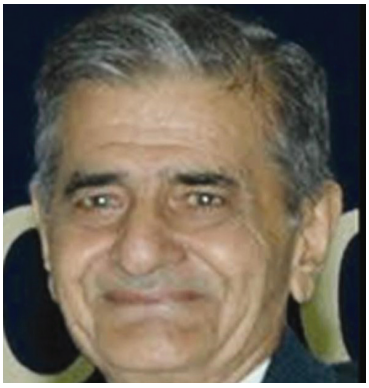

Sikka, Devraj
(Elected 1984)

D. R. Sikka's association with the Indian summer monsoon (as he called it) began in 1954, when he joined the India Meteorological Department (IMD), and ceased only with the end of his life on 18 March 2017. Sikka joined IITM in December 1962, because he wanted to devote himself to research. Of his discoveries, the most important ones that have received worldwide recognition are important facets of the sub-seasonal variation of the monsoon revealed by analysis of daily satellite imagery and the link between the Indian summer monsoon rainfall and the El Ninõ Southern Oscillation (ENSO) phenomenon over the Pacific. Sikka's contributions have been recognized with several awards. He was elected a fellow of the Indian Academy of Sciences in 1984, was given the very first Lifetime Achievement Award in Atmospheric Science and Technology by the Ministry of Earth Sciences in 2007, Sir Gilbert Thomas Walker Gold Medal in 2012 and Lifetime achievement award in 2017 by the India Meteorological Society.

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Chowdhury, Mihir
(Elected 1977)

Mihir Chowdhury, one of the pioneers in modern physical chemistry in India, passed away on 28 March 2017. He is widely respected for introducing lasers and many state-of-the-art techniques in physical chemistry research in India. He along with M. V. George, J. P. Mittal, V. Krishnan, late P. Natarajan and V. Ramamurthy ushered in modern photochemistry in India. He joined Sadhan Basu's laboratory at Calcutta University and obtained his Ph D in 1960. in 1964, Chowdhury joined the Department of Magnetism (now Department of Solid State Physics), Indian Association for the Cultivation of Science (IACS), Kolkata as a CSIR pool-officer. In 1966, Chowdhury moved to Presidency College as a full professor (later Head) in the Department of Chemistry and continued to carry out his research at IACS. In 1976, Chowdhury moved back to IACS as the Professor and Head of the Department of Physical Chemistry. Within a decade, he transformed it as one of the leading centres of physical chemistry in India with five fellows of the Indian Academy of Sciences and four Shanti Swarup Bhatnagar award winners. Chowdhury himself became a fellow of Indian Academy of Sciences (IASc), Bengaluru in 1977 and of the Indian National Science Academy (INSA), New Delhi in 1980, and received the Bhatnagar Award in 1977. After official retirement in 2002, he continued as a senior scientist of INSA till 2006. Because of failing health, he stopped coming to the laboratory after 2006.

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