INDIAN ACADEMY OF SCIENCES

Bengaluru

PROGRAMME • ABSTRACTS • SPEAKER BIOGRAPHIES

37th MID-YEAR MEETING

3–4 July 2026

Venue:

Faculty Hall

Indian Institute of Science

Bengaluru

3 July 2026 (Friday)
9:30–10:10 AM

Session 1A: Special Lecture

Chairperson
Meena Mahajan, IMSc, Chennai

Digital Transformation and Environmental Sustainability



Pradip Dutta

IISc, Bengaluru

Pradip Dutta is a Professor at the Interdisciplinary Centre for Energy Research, Indian Institute of Science, Bengaluru. His research focuses on thermal energy storage, advanced cooling technologies, and phase-change and adsorption-based energy systems.

He earned his bachelor's degree in Mechanical Engineering from IIT Kharagpur, master's degree from IIT Madras, and PhD in Mechanical Engineering from Columbia University, New York. He is a Fellow of ASME, ASTFE, AUTSE, and National Academies of Science and Engineering in India – INSA, NASI, and INAE.

He has received several prestigious honors, including the Distinguished Alumnus Awards from both IIT Kharagpur and IIT Madras, the J.C. Bose National Fellowship, and the Outstanding Teacher Award from the Indian National Academy of Engineering. He also served as the President of the Indian Society for Heat and Mass Transfer.

He was elected as a Fellow of the Indian Academy of Sciences in 2012.

Digitalisation continues to move at warp speed, transforming lives and livelihoods. At the same time, rapid digitalisation is exacerbating environmental and climate challenges. This talk highlights the direct environmental impacts of our increased reliance on digital tools – from raw material depletion, water and energy use, air quality degradation to pollution and waste generation. These impacts are accentuated by emerging technologies such as the Internet of Things (IoT), Blockchain, and Artificial Intelligence (AI), as well as digital services ranging from emailing to video streaming.

At the heart of the expanding digital economy lie data centers, which store and process vast volumes of data for consumers, businesses, and the public sector. Data centers are characterised by huge computing capacity and cooling requirements that consume large amounts of both energy and water. This talk also highlights the projected growth in energy demand from data centers and the corresponding need to scale-up decarbonised electricity grid capacity.

Sessions 1A to 1C

https://youtube.com/live/ydO1eMGT0Vs?feature=share

3 July 2026 (Friday)
10:10–10:30 AM

Session 1B:
Inaugural Lectures by Fellows and Associates

Chairperson
C Pulla Rao, SRM University, Guntur



Subroto Mukerjee
IISc, Bengaluru

Subroto Mukerjee is a Professor in the Department of Physics at the Indian Institute of Science, Bengaluru, and works broadly in the area of theoretical condensed matter physics. He obtained his PhD in Physics from Princeton University and was a postdoctoral fellow at the University of California, Berkeley, before joining as a Faculty at IISc. His current research interests include transport phenomena in condensed matter systems, as well as thermalisation and localisation in quantum systems.

He was elected as a Fellow of the Indian Academy of Sciences in 2023.

Electron Hydrodynamics: When Electrons in a Wire Flow like Water through a Pipe

In conventional metallic conductors, electrical transport is assumed to undergo collisions with impurities and lattice vibrations, which degrade their momentum. This framework forms the basis of the conventional derivation of Ohm's law. On the other hand, the transport of fluids (like water) through a pipe is fundamentally different because the fluid particles undergo momentum-preserving collisions among themselves. Over the last decade, with the advent of ultra-clean electronic systems like graphene, it has become possible to induce electrons to flow through channels or wires like conventional fluids through a pipe. This has led to the emergence of a new field of study called electron hydrodynamics. In this talk, I will briefly describe some of the phenomenology and experimental signatures of hydrodynamic behaviour. I will also show that a combination of hydrodynamics and quantum effects due to Berry curvature arising from band structure can give rise to novel transport coefficients that do not exist in conventional metals.

3 July 2026 (Friday)
10:35–10:55 AM

Session 1B:
Inaugural Lectures by Fellows and Associates

Chairperson
C Pulla Rao, SRM University, Guntur



Rusa Mandal
IIT Gandhinagar, Gandhinagar

Rusa Mandal is an Associate Professor in the Department of Physics at Indian Institute of Technology Gandhinagar. Her research focuses on theoretical particle physics, particularly flavour physics, rare B-meson decays, effective field theories, and hadronic methods. Her work aims to probe physics beyond the Standard Model through precision studies. She is also interested in topics at the interface of particle physics and cosmology, including baryogenesis and dark matter.

She was selected as an Associate of the Indian Academy of Sciences in 2024.

From Quarks to New Physics: Lessons from B Meson

Rare decays of B-mesons provide some of the most sensitive probes of physics beyond the Standard Model. Over the past decade, measurements from experiments such as LHC and Belle II have reached unprecedented precision, enabling stringent tests of our understanding of nature at the smallest scales. A major challenge in interpreting these measurements, however, arises from the effects of the strong interaction, which binds quarks into hadrons and introduces significant theoretical uncertainties. In this talk, I will provide an overview of how B-meson decays are used to search for signs of new physics and discuss the central role played by hadronic effects in these studies. I will then describe recent theoretical developments that improve our understanding of these strong-interaction contributions using quantum field theory techniques. These advances are helping to sharpen the comparison between theory and experiment, thereby enhancing the discovery potential of current and future flavour-physics experiments.

3 July 2026 (Friday)
11:20–11:40 AM

Session 1C:
Inaugural Lectures by Fellows and Associates

Chairperson

V Prakash, Former Director, CSIR-CFTRI, Mysuru



Prasanta K Das

IACS, Kolkata

Prasanta Kumar Das is a Senior Professor in the School of Biological Sciences at Indian Association for the Cultivation of Science (IACS). He obtained his BSc (1992) and MSc (1994) degrees in Chemistry from Jadavpur University and earned his PhD from CSIR-Indian Institute of Chemical Technology in 1999. He subsequently pursued postdoctoral research at Massachusetts Institute of Technology, USA, where he expanded his expertise in the interdisciplinary areas of chemical and biological sciences.

He joined IACS in 2002 and has since established a distinguished research program in Bioorganic Chemistry. He is a recipient of several prestigious honours, including the Materials Research Society of India (MRSI) Medal, CRSI Bronze Medal, DST Ramanna Fellowship, and the B.M. Birla Science Prize in Chemistry. His research focuses on molecular self-assembly and supramolecular nanostructures, with applications ranging from biocatalysis and drug delivery to bioimaging, sensing, theranostics, and environmental remediation. Through his work, he seeks to address important biomedical challenges by translating fundamental dis coveries in molecular self-assembly and supramolecular organization into practical applications and therapeutic solutions.

He was elected as a Fellow of the Indian Academy of Sciences in 2017.

Fluorescent Organic Nanostructures in Oxidoreductase Enzyme Assisted Diagnosis of Cancer

With the rapid advancements in biotechnology, the inclusion of nanostructures in biomedical applications has become inevitable in recent years. Due to their unique structural properties, self-assembled organic nanostructures can significantly improve drug solubility and enhance therapeutic efficiency. Self-aggregated Fluorescent Organic Nanoparticles (FONPs) have gained significant attention in the field of theranostics due to their Aggregation-Induced Emission (AIE) properties, ease of fabrication, and biocompatibility. These nanostructures have shown potential as probes for the detection of specific biomolecules and cancer biomarkers, providing enhanced sensitivity and selectivity in bioimaging and diagnostics.

In this perspective, our group has designed and developed naphthalimide-based FONPs that respond to the redox behaviour of enzymes such as Protein Disulfide Isomerase (PDI) and Lactate Dehydrogenase A (LDHA), enabling the sensitive detection of cancer cells. Additionally, FONPs functionalized with specific ligands, such as transferrin and nipecotic acid, can target cancer cells expressing TfR and GABA receptors and have been employed for drug-induced selective killing of cancer cells. Thus, self-aggregated organic nanostructures show great potential for advancing both diagnostic and therapeutic strategies in cancer treatment.

3 July 2026 (Friday)
11:45 AM–12:05 PM

Session 1C:
Inaugural Lectures by Fellows and Associates

Chairperson

V Prakash, Former Director, CSIR-CFTRI, Mysuru



Sandhya Shenoy

Srinivas University, Mangaluru

Sandhya Shenoy obtained her MSc and PhD in Chemistry from the National Institute of Technology Karnataka, Surathkal, in 2009 and 2013, respectively. She subsequently pursued postdoctoral research at the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, under the supervision of Prof. Umesh V Waghmare. In 2017, she joined Srinivas University, Mukka, Mangaluru, as a DST INSPIRE Faculty Fellow and was appointed as a SERB Research Scientist in 2022. She currently serves as a Professor and Principal Research Scientist at Srinivas University.

Her research focuses on materials for energy and environmental applications, with a major emphasis on electronic structure engineering. Her primary research interest lies in the development of high-performance thermoelectric materials, while her contributions also extend to supercapacitors, photocatalysis, nanomaterial synthesis, and nanofluids. She is a recipient of several prestigious awards, including the NASI Young Scientist Platinum Jubilee Award (2021) in Chemical Sciences, the Dr. Kalpana Chawla Young Women Scientist State Award from the Government of Karnataka (2023), the SMC Bronze Medal (2024), and the CRS Silver Medal (2025).

She was selected as an Associate of the Indian Academy of Sciences in 2023.

Electronic Structure Engineering for the Development of High-performance Thermoelectric Materials

Thermoelectric materials are a class of materials that have the ability to directly and reversibly convert a temperature difference into an electric potential and, consequently, have the potential to scavenge waste heat and convert it into useful electricity. Although all materials exhibit a non-zero thermoelectric effect, it is usually too small for efficient energy conversion. The challenge arises from the conflicting combination of material properties and their well-known inter-dependence. This complicates efforts to develop strategies for improving a material's figure of merit, zT.

SnTe, a homologue of the well-known thermoelectric material PbTe, possesses a rock-salt structure and an electronic structure similar to that of PbTe and is considered environmentally benign. However, SnTe suffers from a low zT due to its high carrier concentration, smaller band gap, and larger separation between the valence sub-bands compared to PbTe. This lecture will focus on the electronic structure engineering of SnTe through doping to improve the Seebeck coefficient, with particular emphasis on enhancing the average zT. The discovery of new resonant dopants in SnTe will be discussed, along with other approaches. The extension of these strategies to other chalcogenide materials for the development of high-performance thermoelectrics will also be deliberated.

3 July 2026 (Friday)
12:10–12:30 PM

Session 1C:
Inaugural Lectures by Fellows and Associates

Chairperson

V Prakash, Former Director, CSIR-CFTRI, Mysuru



G Jagadeesh

IISc, Bengaluru

Gopalan Jagadeesh is the Chair and Professor at the Department of Aerospace Engineering, Indian Institute of Science (IISc), Bengaluru. He is also the Founder Chairman of the Centre of Excellence in Hypersonics at IISc and mentors several startups focused on transdisciplinary applications of shock waves.

His research interests include hypersonic aerothermodynamics and shock-wave propagation in complex fluids. He has published extensively in these areas and holds several patents related to innovations involving shock waves and their applications.

He is a Fellow of the Royal Aeronautical Society, The Indian National Science Academy, the National Academy of Sciences, India and the Indian National Academy of Engineering.

In addition to his academic contributions, he actively works with voluntary organizations to promote science education among high-school and college students, particularly in rural India.

He was elected as a Fellow of the Indian Academy of Sciences in 2022.

Shocking Waves – Healing Touch!

The phenomenon of “shock waves” has historically been associated with aerospace engineering, particularly with supersonic flight. Shock waves occur in nature when different elements within a fluid approach one another at velocities higher than the local speed of sound. These waves are also generated when massive energy is dissipated over an ultra-short duration, as in explosive events. Many methodologies and facilities for generating shock waves of requisite strength have been designed and indigenously developed at the Laboratory for Hypersonic and Shockwave Research (LHSR), Indian Institute of Science, Bengaluru. Over the years, these facilities have enabled several interdisciplinary research programmes at IISc, involving faculty members from physics, chemistry, biology, and materials engineering.

Some of the novel techniques that will be discussed in this talk include retractable aerospikes, smart coatings, forward-facing jets, and concentrated energy deposition for reducing the aerodynamic drag around vehicles flying at hypersonic speeds. Concurrently, by utilizing the remarkable ability of shock waves to instantaneously enhance pressure and temperature in the propagating medium, several innovative shock-wave-assisted techniques have been developed at LHSR. These include non-invasive needleless vaccine delivery, cell transformation, wound healing, biofilm destruction, metal surface modification, and preservative impregnation in bamboo. A broad overview of the recent transdisciplinary shock-wave research and technology development activities at LHSR will be presented in this talk.

3 July 2026 (Friday)
12:35–12:55 PM

Session 1C:
Inaugural Lectures by Fellows and Associates

Chairperson
V Prakash
Former Director, CSIR-CFTRI, Mysuru



Yogesh M Joshi
IIT Kanpur, Kanpur

Yogesh M Joshi obtained his BE degree from Pune University in 1996 and earned his PhD in Chemical Engineering from the Indian Institute of Technology Bombay in 2001. He subsequently carried out postdoctoral research at the Benjamin Levich Institute, New York. In 2004, he joined the Department of Chemical Engineering at the Indian Institute of Technology Kanpur, where he currently serves as the Sir J.C. Bose National Fellow at the Mr and Mrs Gian Singh Bindra Chair Professor.

His research interests encompass the rheology of complex fluids, soft matter, interfacial science and engineering, clay dispersions, and polymer science and engineering. He is a Senior Editor of the journal *Langmuir* and serves on the Editorial Advisory Boards of *Physics of Fluids*, *Journal of Rheology*, *Transport Phenomena*, and *Rheologica Acta*. He received the prestigious Shanti Swarup Bhatnagar Prize in Engineering Sciences in 2015.

He is an elected Fellow of the Society of Rheology (USA), the Indian National Science Academy, The Indian National Academy of Engineering, and The National Academy of Sciences, India. In addition to his academic contributions, he works closely with several industries to improve the flow behaviour and stability of soft materials.

He was elected as a Fellow of the Indian Academy of Sciences in 2023.

Different Shades of Thixotropy

Yield-stress fluids are ubiquitous in the chemical industry. Traditionally, the flow behaviour of yield-stress fluids is represented by the empirical Bingham plastic model, which suggests that no flow occurs until a threshold stress, known as the yield stress, is exceeded. The absence of flow under a finite applied stress arises from the lack of translational mobility of the material's constituents, either due to physical or energetic cages. This lack of translational mobility also renders the material out of thermodynamic equilibrium and therefore thixotropic, resulting in an increase in viscosity with time and a decrease under strong flow.

In this talk, we shall ponder questions such as: Are all yield-stress materials thixotropic, and vice versa? How does thixotropy manifest in different flow behaviours? Are there intrinsic constitutive relations (relationships between stress and strain rate) for yield-stress and thixotropic materials? We shall discuss these questions in light of recent theoretical and experimental work carried out in my group.

3 July 2026 (Friday)
02:30–02:50 PM

Session 1D:
Inaugural Lectures by Fellows and Associates

Chairperson
Analabha Basu, NIBMG, Kalyani



K Subramaniam
IIT Madras, Chennai

K Subramaniam obtained his PhD in Biochemistry from the Indian Institute of Science, Bengaluru, in 1994 under the mentorship of Prof. S Mahadevan. He subsequently pursued postdoctoral research in the Department of Molecular Biology and Genetics at the Johns Hopkins University School of Medicine under the guidance of Prof. Geraldine Seydoux.

He served as a faculty member at the Indian Institute of Technology Kanpur from 2002 to 2013 and has been a faculty member at the Indian Institute of Technology Madras since 2014. He was a Wellcome Trust International Senior Research Fellow from 2003 to 2009 and a member of the Guha Research Conference.

His research focuses on identifying genes that regulate germ cell development using the nematode *Caenorhabditis elegans* as a model system. In particular, his laboratory investigates the roles of RNA-binding proteins and their targets in the regulation of germ cell development.

He was elected as a Fellow of the Indian Academy of Sciences in 2019.

PLP-1 / PURA – An RNA-granule Component with Roles in Small RNA-mediated Gene Regulation

Regulation of gene expression by small RNA pathways — including the siRNA, piRNA, and miRNA pathways — is evolutionarily conserved and plays essential roles in processes ranging from embryonic development and adult homeostasis to the protection of the germline genome from foreign genetic elements. In these pathways, small RNAs guide specific RNA-binding proteins (RBPs) to target mRNAs, thereby altering their translation and/or stability through multiple mechanisms. The small RNAs and RBPs involved in these processes are organized into large ribonucleoprotein aggregates in both the germline (P granules or germ granules) and the soma (stress granules and P bodies).

We have recently identified the *Caenorhabditis elegans* protein PLP-1 as a component of P granules with important roles in germline gene silencing. Our findings indicate that PLP-1 functions downstream of small RNA biogenesis during the initiation of germline gene silencing. In addition to its localization in P granules, PLP-1 is also present in perinuclear granules of neurons. Studies from other groups have shown that its mammalian ortholog, PURA (also known as Pur-α), localizes to similar neuronal RNA granules and is essential for brain development. These observations suggest that the functions of PLP-1 extend beyond the germline and may contribute to diverse biological contexts in which RNA granules regulate gene expression.

3 July 2026 (Friday)
02:55–03:15 PM

Session 1D:
Inaugural Lectures by Fellows and Associates

Chairperson
Analabha Basu, NIBMG, Kalyani



Naveen C Bisht
NIPGR, New Delhi

Naveen C Bisht is a Plant Geneticist and serves as Senior Scientist and Group Leader at the BRIC-National Institute of Plant Genome Research, New Delhi. His research focuses on plant secondary metabolism and nutritional genomics in Indian oilseed mustard. He has made pioneering contributions to understanding the molecular and genetic regulation of glucosinolate diversity in Brassicaceae species, leading to the identification of novel genes, genetic markers, and regulatory proteins that govern glucosinolate accumulation and composition in Indian mustard.

Using CRISPR/Cas9 genome-editing technology, his laboratory has successfully edited multiple glucosinolate transporter (GTR) genes to develop transgene-free mustard lines with low seed glucosinolate content while maintaining high levels of protective glucosinolates in vegetative tissues. These improved lines are currently undergoing Indian Council of Agricultural Research-coordinated AICRP field trials, representing a significant step toward the development of canola-quality Indian mustard. In his recent work, he demonstrated the biofortification of Indian mustard with the cancer-preventive glucosinolate glucoraphanin through precise editing of the AOP2 gene family.

His scientific achievements are reflected in numerous high-impact publications, patents, and prestigious honours, including the DBT–TATA Innovation Fellowship, DBT–S. Ramachandran National Bioscience Award, DBT–Innovative Young Biotechnologist Award (IYBA), NASI–Scopus Young Scientist Award, and INSA Young Scientist Award. He is also an elected Fellow of The Indian National Science Academy, The National Academy of Sciences, India, and the National Academy of Agricultural Sciences.

He was elected as a Fellow of the Indian Academy of Sciences in 2023.

Precision Breeding of Indian Oilseed Mustard through Genome Editing

Glucosinolates are Brassicaceae-specific secondary metabolites that play important roles in human health and agriculture. Together with their hydrolysis products — thiocyanates, isothiocyanates, and nitriles — they constitute the "mustard oil bomb" and confer diverse biological activities. A major breeding objective in oilseed Brassicas is to improve oil and seed meal quality by developing canola-quality lines with seed glucosinolate levels below 30 µmol g^{-1} DW, as high seed glucosinolate content is considered anti-nutritional. An alternative approach focuses on nutritional enhancement through increased accumulation of beneficial glucosinolates. Among these, glucoraphanin is particularly valued for its anti-carcinogenic, detoxifying, anti-inflammatory, and anti-microbial properties.

At the BRIC-National Institute of Plant Genome Research, my laboratory investigates the molecular and genetic regulation of glucosinolate biosynthesis and transport in Indian mustard (*Brassica juncea* L.). Our studies indicate that seed glucosinolate content is a quantitative trait controlled by six to seven quantitative trait loci (QTLs). Fine-mapping approaches enabled the identification of key candidate genes, which were subsequently targeted using RNA interference (RNAi)-based suppression and CRISPR/Cas9-mediated genome-editing strategies.

We have reported the targeted editing of glucosinolate transporter (GTR) genes to develop mustard lines with low seed glucosinolate content while retaining high glucosinolate levels in vegetative tissues for effective plant defence. Transgene-free mustard lines exhibiting the desirable LOW-seed, HIGH-leaf glucosinolate trait are currently being evaluated in the Indian Council of Agricultural Research coordinated Multi-location Advanced Varietal Trials (AVT-1). In addition, we have generated transgene-free mustard lines with enhanced glucoraphanin accumulation through multiplex editing of members of the GSL-AOP2 gene family. These findings highlight the potential of genome editing as a precise, transgene-free approach for improving the nutritional and agronomic quality of Brassica oilseed crops.

3 July 2026 (Friday)
03:20–03:40 PM

Session 1D:
Inaugural Lectures by Fellows and Associates

Chairperson
Analabha Basu, NIBMG, Kalyani



Munia Ganguli
IGIB, New Delhi

Munia Ganguli is a Chief Scientist at the CSIR-Institute of Genomics and Integrative Biology, New Delhi, and a Professor at the Academy of Scientific and Innovative Research. She obtained her master's degree in Chemistry from Jadavpur University and earned her PhD in Solid State Chemistry from the Indian Institute of Science, Bengaluru. She subsequently pursued postdoctoral research at the Philipps University, Marburg.

For nearly two decades, her laboratory has focused on the development of nanomaterials for gene delivery and the application of nanotechnological tools, such as Atomic Force Microscopy, to investigate nanomorphologies and molecular interactions. A major area of her research involves the design and development of cell-penetrating peptides and biodegradable polymers for gene therapy and gene-editing applications.

She has authored more than 70 research publications, holds several international patents, and has received multiple competitive research grants. She is a recipient of the National Bioscience Award for Career Development from the Department of Biotechnology (DBT), Government of India, in recognition of her contributions to nanobiotechnology. She has also been awarded the SERB-POWER Fellowship by the Department of Science and Technology (DST), which recognizes outstanding women researchers in India.

She was elected as a Fellow of the Indian Academy of Sciences in 2024.

Building Targeted Non-viral Gene Delivery Systems

Nucleic acid-based therapeutics hold immense promise for transforming the treatment of a wide range of diseases. However, their successful clinical application depends on overcoming poor pharmacological properties through appropriate packaging and targeted release at the site of action. To address the challenges associated with nucleic acid delivery, non-viral vectors such as lipids, peptides, and polymers have been extensively developed and optimized for *in vivo* applications.

Although significant progress has been made in the development of non-viral delivery systems, the design of an efficient gene delivery platform remains challenging and requires a thorough understanding of organ-specific delivery barriers and the rational modulation of carrier systems to overcome them. Our laboratory has developed peptide- and polymer-based gene delivery systems through rational design that can overcome both local and systemic barriers and facilitate delivery to organs such as the skin, lungs, muscle, and brain. The presentation will highlight the different strategies employed to achieve efficient and targeted delivery to these organs.

Session 1D

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3 July 2026 (Friday)
03:45–04:05 PM

Session 1D:
Inaugural Lectures by Fellows and Associates

Chairperson
Analabha Basu, NIBMG, Kalyani



Shuvadeep Ganguly
AIIMS, Kalyani

Shuvadeep Ganguly is an Assistant Professor in the Department of Medical Oncology and Hematology at All India Institute of Medical Sciences, Kalyani. He completed his undergraduate, postgraduate, and postdoctoral training at All India Institute of Medical Sciences, New Delhi.

His research interests include cancer supportive care, cancer immunology, and clinical trials in oncology, with a particular focus on challenges relevant to India and other low-resource settings. He has conducted studies on the role of malnutrition and micronutrients in childhood malignancies and has worked on interventions aimed at improving nutrition and supportive care during cancer treatment.

He is also actively involved in evaluating the cost-effectiveness of anticancer therapies from an Indian healthcare perspective, contributing to evidence-based approaches for improving cancer care in resource-constrained settings.

He was selected as an Associate of the Indian Academy of Sciences in 2024.

Understanding Supportive Therapy in Cancer to Bridge the Survival Gap

Cancer survival continues to differ markedly between high-income countries and Low- and Middle-Income Countries (LMICs) such as India, a disparity that is particularly evident in pediatric oncology despite the availability of curative therapies. Beyond tumor biology and treatment protocols, supportive care remains an underrecognized determinant of patient outcomes. This talk frames cancer treatment as a dynamic interaction between disease, therapy, and host resilience, with a particular focus on nutrition as a critical yet often overlooked component.

Drawing on clinical and translational research in childhood cancer, the presentation will highlight how nutritional status, both at diagnosis and throughout treatment, influences treatment tolerance, recovery, and overall outcomes. The discussion aims to position supportive care during cancer treatment as a central scientific and clinical challenge, fostering interdisciplinary engagement across fields such as metabolism, immunology, and public health to help reduce global disparities in cancer survival.

3 July 2026 (Friday)
04:10–04:30 PM

Session 1D:
Inaugural Lectures by Fellows and Associates

Chairperson
Analabha Basu, NIBMG, Kalyani



Sathees C Raghavan

IISc, Bengaluru

Sathees C Raghavan earned his PhD from the Banaras Hindu University, Varanasi, followed by postdoctoral research at the University of Southern California, USA. He now serves as Professor in the Department of Biochemistry and Chair of the Central Animal Facility at the Indian Institute of Science (IISc), Bengaluru.

His research group at IISc investigates the mechanisms of genomic instability in leukemia and lymphoma. They also explore the immune system's role in chromosomal abnormalities, mechanisms of DNA double-strand break repair, and cancer therapeutics.

With over 185 publications in top peer-reviewed journals and 14 patents to his name, he has mentored 41 students, of whom 31 completed their PhDs.

His accolades include the Shanti Swarup Bhatnagar Prize (2013), Leukemia Research Foundation Award (USA, 2010), Kobayashi Foundation Award (2016), NASI-Reliance Industries Platinum Jubilee Award (2015), ISCB S. P. RAY Chaudhuri Lecture Award (2023), Society for Biological Chemistry Ram Rao Lecture Award (2024), J.C. Bose National Fellowship (2024), etc.

He is a Fellow of The National Academy of Sciences, India, Prayagraj; the Indian National Science Academy, New Delhi (2023), and the National Academy of Medical Sciences, New Delhi (2025).

He was elected as a Fellow of the Indian Academy of Sciences in 2016.

The Molecular Basis of Chromosomal Translocations: Roles of DNA Conformation and Immune Machinery

Hematopoietic malignancies, including leukemias and lymphomas, account for roughly 8–10% of cancers worldwide and are frequently associated with characteristic chromosomal translocations that serve as important diagnostic and prognostic markers. These translocations arise when aberrant DNA double strand breaks (DSBs) on different chromosomes are misrepaired and rejoined. However, the molecular events that predispose specific genomic loci to such pathogenic breaks remain poorly understood. Recent evidence implicates non-B DNA conformations – such as G quadruplexes, cruciforms, triplexes, and R loops – as intrinsic structural features that promote genome instability at translocation-prone regions. Building on this concept, our work demonstrates that many chromosomal fragile regions linked to hematopoietic neoplasia adopt these alternative DNA structures. We further show that lymphoid-specific enzymes that normally generate immunoglobulin diversity – RAG endonucleases and activation induced cytidine deaminase (AID) – can target these non-B DNA structures and contribute to DSB formation at non-immunoglobulin loci. Notably, we find that a functional non-amer element positioned near a non-B DNA motif markedly enhances RAG-mediated cleavage, revealing a previously unrecognized mechanism by which RAG activity can drive chromosomal translocations in lymphoid cancers. Together, these findings integrate DNA secondary structure and lymphoid-specific enzymology into a unified model of translocation genesis, with implications for understanding cancer etiology, improving molecular diagnostics, and identifying new targets for genomic stability-preserving therapies.

3 July 2026 (Friday)
05:30–06:10 PM

Session 1E:
Public Lecture

https://youtube.com/live/0rJOeo8podY?feature=share

Chairperson
Raghavan Varadarajan, President, IASc



Seema Alavi

Ashoka University, Sonipat

Seema Alavi is a historian who specializes in early modern and modern South Asia, with an interest in the transformation of the region's legacy from Indo-Persian to one heavily affected by British colonial rule. She started her teaching career at the Jawaharlal Nehru University, New Delhi, and has been a Professor at the Jamia Millia Islamia, New Delhi, and at the University of Delhi, New Delhi, before moving to the Ashoka University, Sonipat, in 2022.

Alavi earned her PhD from the University of Cambridge, England. She has twice been a Fulbright Scholar, a Smuts Visiting Fellow at the University of Cambridge, and a visiting scholar at the Harvard-Yenching Institute, Cambridge. In 2010, she was at the Harvard Radcliffe Institute, Cambridge, as a William Bentinck-Smith Fellow.

She has written books on the military, medical, and religious histories of India. Her most recent books are the Albert Hourani Book Award winner and the Monsoon Book Award (2025) winner, "*Muslim Cosmopolitanism in the Age of Empire*", published by Harvard University Press, USA, and "*Sovereigns of the Sea: Omani Ambition in the Age of Empire*", published in 2023 by Penguin Allen Lane (an imprint of Penguin Random House India).

She wrote "*The Sepoys and the Company: Tradition and Transition in Northern India* 1770–1830" (Oxford University Press, 1995), and co-authored with Muzaffar Alam, "*A European Experience of the Mughal Orient: The I'jaz-i Arsalani (Persian Letters 1773–1779) of Antoine-Louis Henri Polier*" (Oxford University Press, 2001). Her book "*The Eighteenth Century in India – Debates in Indian History and Society*" (Oxford University Press, 2003) is a popular reader in India and abroad. In 2009, she wrote "*Islam and Healing: Loss and Recovery of an Indo-Muslim Medical Tradition, 1600–1900*" (Palgrave Macmillan, 2008). She serves on the Editorial Board of several national and international journals, including *Modern Asian Studies*, UK; *Journal of Colonialism and Colonial History*, UK; *Journal of the Royal Asiatic Society*, UK; and *Biblio*, New Delhi.

Entangled Histories: Unani Medicine, Religion and Politics in British India

The talk puts the spotlight on the entangled histories of medicine, religion, and politics in the long 19th century – the period of British rule in India. It analyses the engagement between Unani – a Greco Arab system of family-controlled medical knowledge- and English doctors.

She argues that Unani flourished as an aristocratic medical tradition in the Mughal Empire and during the period of imperial decline (18th century), it shifted its focus from health as an aristocratic virtue to an emphasis on medical wisdom and science. This facilitated its intellectual dialogue with English doctors during India's colonial encounter.

Colonial rule triggered fresh changes in the Unani healing as it tried to accommodate itself with English medical thinking. Individuals outside the established families of healers reached out to Sufi and Prophet healing practices. They used the freshly arrived print and access to the vernaculars to incorporate them into their medical writings. The old literate elite families viewed this religious outreach as a grave threat to Unani. They responded by setting up institutions of learning to professionalize and modernize Unani knowledge by restoring its Greco-Arab text-based core. These institutions helped them maintain full control over medical knowledge.

The talk focuses on these developments to show how ideas of 'medical modernity' and professionalization are not necessarily singular and Eurocentric but context-based. The 'modern' Unani, bereft of religious practice, found an easy entry into the medical projects of contemporary India's health ministry.



Nisheeth Srivastava

IIT Kanpur, Kanpur

Nisheeth Srivastava is a Professor of Common Sense in the Department of Computer Science & Engineering and the Department of Cognitive Science at the Indian Institute of Technology Kanpur, Kanpur. He completed his postdoctoral training at University of California San Diego and received his PhD from the University of Minnesota, USA. He currently leads CDIS (Center for Developing Intelligent Systems) and ARF (Airawat Research Foundation), conducting inter-disciplinary research at the intersection of artificial intelligence, cognitive science, and computational social systems.

4 July 2026 (Saturday)
9:40–10:00 AM

Session 2A:
Symposium on
Artificial Intelligence in Health

Conveners

Somdatta Sinha, IISER Kolkata, Nadia
Narendra Dixit, IISc, Bengaluru

BODH – A New Way of Validating AI Models for Health

BODH AI has been conceived by our team at IIT Kanpur as a platform for benchmarking, testing, and validating AI algorithms for clinical use in a privacy-preserving and institutionally credible manner. The framework recognizes that conventional software testing is inadequate for healthcare AI, that robust third-party validation is difficult because of privacy constraints and limited access to diverse clinical datasets, and that public institutions require dedicated operational capacity to manage such testing systems. The platform architecture is built around an open benchmarking mechanism, consent-governed data use, and quality-preserving management of benchmark datasets. The same framework further envisages a structured ecosystem in which model developers can test algorithms in a double-blind, federated setup, benchmark performance on out-of-sample data, and generate an auditable record of model behavior, while preserving privacy and statistical validity. This talk will introduce the audience to BODH, and describe how it works in a lightly technical manner.

Sessions 2A and 2B

https://youtube.com/live/-Ek4NTASs3s?feature=share



Sushmita Mitra

ISI, Kolkata

Sushmita Mitra is a full professor at the Machine Intelligence Unit (MIU), Indian Statistical Institute, Kolkata. She received the National Talent Search Scholarship (1978–1983) from NCERT, India, the *University Gold Medal* in 1988, the *IEEE TNN Outstanding Paper Award* in 1994 for her pioneering work in neuro-fuzzy computing, the CIMPA-INRIA-UNESCO Fellowship in 1996, and the *Fulbright-Nehru Senior Research Fellowship* in 2018–2020. She was the *INAE Chair Professor* during 2018–2020 and was awarded the prestigious J.C. Bose National Fellowship for 2021–2026. She is the author of the books "*Neuro-Fuzzy Pattern Recognition: Methods in Soft Computing*" and "*Data Mining: Multimedia, Soft Computing, and Bioinformatics*", published by John Wiley, and "*Introduction to Machine Learning and Bioinformatics*", Chapman & Hall/CRC Press, besides a host of other edited books. She is an Associate Editor of *IEEE/ACM Trans. on Computational Biology and Bioinformatics*, *Information Sciences*, "*Proceedings of the INSA*, *Computers in Biology and Medicine*, *IEEE Trans. on Fuzzy Systems*, *Neural Networks*, a Founding Associate Editor of *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery* (*WIRE DMKD*), and a Senior Associate Editor of *Sadhana*. She has more than 200 research publications in refereed international journals.

She is a Fellow of the IEEE, The World Academy of Sciences (TWAS), Indian National Science Academy (INSA), International Association for Pattern Recognition (IAPR), Asia-Pacific Artificial Intelligence Association (AAIA), and Fellow of the Indian National Academy of Engineering (INAE), and The National Academy of Sciences, India (NASI). She serves as a Member of the Inter-Academy Panel for Women in STEMM and a Member of the Equality, Diversity, and Inclusion Groups of CAETS and IAPR. She served as the Chair of the IEEE Kolkata Section (2021–2022) and is an IEEE CIS Distinguished Lecturer. Her current research interests include data science, machine learning, soft computing, medical image processing, and Bioinformatics.

She was elected as a Fellow of the Indian Academy of Sciences in 2024.

4 July 2026 (Saturday)
10:00–10:20 AM

Session 2A:
Symposium on Artificial Intelligence in Health

Conveners

Somdatta Sinha, IISER Kolkata, Nadia
Narendra Dixit, IISc, Bengaluru

Artificial Intelligence in Healthcare

With the inherent boom in the availability of large volumes of multimodal healthcare data on the internet, their automated processing is becoming increasingly relevant today. Manual delineation and processing are expensive, biased, and slow. Here lies the utility of artificial intelligence, encompassing machine learning, and deep learning. The role of AI is to provide assistive intelligence to healthcare professionals in their endeavor to arrive at cost-effective, fast, and viable solutions for complex decision-making. This talk outlines the role of AI across several aspects of healthcare, including classification, segmentation, and survival prediction, and explores resource-efficient hybrid models. We discuss applications that use multimodal imagery spanning X-ray, CT, MR, and fundus images to address certain diseases.

4 July 2026 (Saturday)
10:20–10:40 AM

Session 2A:
Symposium on
Artificial Intelligence in Health

Conveners

Somdatta Sinha, IISER Kolkata, Nadia
Narendra Dixit, IISc, Bengaluru



Geetha Manjunath

Niramai Health Analytix Pvt. Ltd, Bengaluru

Geetha Manjunath is the Founder, CEO, and CTO of Niramai Health Analytix Pvt. Ltd, Bengaluru, and has led the company to develop a breakthrough AI solution for detecting early stage breast cancer in a non-invasive, radiation-free manner. She is a Gold Medalist and PhD holder from the Indian Institute of Science, Bengaluru, with management education from Kellogg Chicago. She comes with over 30 years of experience in IT innovation. Before starting NIRAMAI, she was a Lab Director heading AI Research at the Xerox and a Principal Scientist at the Hewlett-Packard Labs.

She has received many international and national recognitions for her innovations and entrepreneurial work, including the CSI Gold Medal, the BIRAC WInER Award 2018, and is on the Forbes List of Top 20 Self-Made Women 2020. She was the winner of the Women Health Innovation Showcase Asia in Singapore, the Accenture Vahini Innovator of the Year Award from *Economic Times*, and the Women Entrepreneur of the Year 2020 by BioSpectrum India. She has about 50+ US patents, is a senior member of the IEEE, and a Fellow of the Indian National Academy of Engineering (INAE).

Affordable and Portable Breast Cancer Screening Test Powered by AI

Breast Cancer is the leading cause of cancer deaths in women. Early detection is very critical to save lives, have better treatment efficacy, and reduce treatment costs. Niramai Health Analytix Pvt. Ltd, Bengaluru, is a deep tech start-up that has pioneered a new test for detecting early-stage breast cancer. Niramai Thermalytix is a radiation-free, non-invasive, affordable, portable, and privacy-aware test for women of all age groups. The solution is based on their patented Artificial Intelligence algorithms which analyse temperature distribution on the skin to generate a breast health report. In this presentation, the speaker will describe the use of this novel technology and how the whole solution is able to give instant AI-based reporting and enable millions of women to detect early cancer and save lives.

4 July 2026 (Saturday)
10:40–11:00 AM

Session 2A:
Symposium on
Artificial Intelligence in Health

Conveners

Somdatta Sinha, IISER Kolkata, Nadia
Narendra Dixit, IISc, Bengaluru

Decoding Immune Response Patterns across Diseases Using Artificial Intelligence and Omics



Nagasuma Chandra

IISc, Bengaluru

Nagasuma Chandra is a Professor at the Department of Biochemistry and is additionally affiliated with the Bioengineering Department at the Indian Institute of Science, Bengaluru. She obtained her PhD from the University of Bristol, UK. Her research is interdisciplinary, involving computational modelling of complex biological processes to address fundamental questions about how genome-wide molecular networks respond to a variety of pathological conditions and how that knowledge can be translated into biomedical applications. She is a Fellow of the Indian National Science Academy, New Delhi.

She was elected as a Fellow of the Indian Academy of Sciences in 2018.

It is intriguing that the human system responds specifically to a variety of pathological triggers, leading to distinct disease phenotypes. Despite decades of research, our systems-level understanding of how different pathological triggers are sensed and relayed to responder genes and pathways resulting in distinct disease phenotypes remains limited. Machine learning approaches have emerged as powerful tools, enabling the discovery of complex molecular patterns from large-scale biological data. Using multi-level attention graph neural networks, we analyse genome-wide protein interaction networks contextualized with whole blood transcriptomic data of thousands of samples from different diseases and identify innate immune processes to be central responders to a variety of pathological triggers. We further find that they exhibit specific patterns characteristic of the pathology and that a small panel of genes is at the core of this, functioning as central tunable factors. The tuned patterns provide insights into the differential pathogenesis mechanisms across a broad spectrum of diseases and can be explored for developing new diagnostic and therapeutic strategies.

4 July 2026 (Saturday)
11:00–11:20 AM

Session 2A: Symposium on Artificial Intelligence in Health

Conveners

Somdatta Sinha, IISER Kolkata, Nadia
Narendra Dixit, IISc, Bengaluru



Oishee Mazumder
TCS Research, Kolkata

Oishee Mazumder received her B.Tech. degree in Electronics and Instrumentation from the West Bengal University of Technology in 2010, graduating with first rank (Gold Medal). She completed her M.Tech. and PhD in Mechatronics and Robotics from Indian Institute of Engineering Science and Technology (IIEST), Shibpur, receiving her PhD in 2017. Her doctoral work focused on assistive systems, including exo-skeletons and ankle–foot prostheses, and was carried out as part of a collaborative project supported by the Department of Science & Technology (DST), New Delhi. This work was showcased at Rashtrapati Bhavan in 2016.

She joined TCS Research in 2017 and currently serves as a Senior Scientist at TCS Research, Kolkata. Her research interests include biomechanical modelling, comput-ational modelling of biophysical systems, and the development of digital twins for healthcare appl-ications. She has authored around 50 research publications, holds 35 patents, and was a top-four finalist for the DST Young Scientist Award (Women in Science and Engineering) in 2020. She is also a recipient of the TCS Young Scientist Award (2023).

From AI to Actionable Physiology: Digital Twins for Precision and Personalized Healthcare

Healthcare is undergoing a shift toward precision and personalized care, driven by the growing availability of large-scale biomedical data and advances in artificial intelligence. However, while AI-driven approaches excel at identifying patterns, they often remain disconnected from the physiological mechanisms required for patient-specific decision-making.

Digital bio twins are emerging as a promising framework to bridge this gap, integrating data-driven models with physiological representations to create dynamic, individualized models of human function. These models enable not only prediction, but also simulation of system behavior under "what-if" scenarios, allowing potential interventions to be explored *in silico* prior to application.

Within this evolving landscape, initiatives such as those at the TCS are advancing a portfolio of digital bio twins across organs and physiological systems, contributing toward the vision of interconnected, patient-specific virtual representations of the human body. In this talk, the broader spectrum and potential of digital twins in healthcare are outlined, with cardiac digital twins presented as a representative example of how non-invasive data can be translated into functional insight and support predictive assessment. Emerging directions further extend this paradigm to performance and wellness contexts, where coupled representations of cardiac, pulmonary, and musculoskeletal systems enable a more holistic view of human function under stress, adaptation, and recovery.

Together, these developments point toward a shift in healthcare; from interpreting data to understanding physiology, and from prediction to informed intervention. This transition enables more personalized, physiology-driven decision-making grounded in actionable insight.

4 July 2026 (Saturday)
12:00–12:20 PM

Session 2B:
Inaugural Lectures by Fellows and Associates

Chairperson
Janendra K Batra, NICHDR, New Delhi

Recent Advances in Post-quantum Cryptography

Much of today's digital security relies on cryptographic mechanisms whose security is based on the presumed computational difficulty of solving certain mathematical problems. However, the advent of large-scale quantum computers is expected to render many of these problems tractable, threatening the security of several widely deployed and standardized cryptographic systems. Post-quantum cryptography is the study of cryptographic schemes that can be implemented on classical computers while remaining secure against quantum adversaries. This lecture will provide an accessible introduction to recent advances in the design, analysis, and global standardization of post-quantum cryptography, and explore the challenges and opportunities involved in securing our digital infrastructure for the quantum era.



Sikhar Patranabis

IBM Research India, Bengaluru

Sikhar Patranabis is a Staff Researcher in the Foundational Cryptography group at IBM Research India. His research spans theoretical and applied cryptography, with a focus on post-quantum cryptography and privacy-enhancing technologies. Previously, he held research positions at VISA Research USA and ETH Zurich. He received his B.Tech. and PhD from the Indian Institute of Technology Kharagpur, Kharagpur, and his work has appeared at leading cryptography and security venues, including Crypto, Eurocrypt, Asiacrypt, IEEE S&P, ACM CCS, USENIX Security, and NDSS. He is an Associate of INAE, and a recipient of several prestigious recognitions, such as the IACR Best Early-Career Paper Award at ASIACRYPT 2022, the IBM PhD Fellowship, and the Qualcomm Research Innovation Fellowship.

He was selected as an Associate of the Indian Academy of Sciences in 2024.

4 July 2026 (Saturday)
12:25–12:45 PM

Session 2B:
Inaugural Lectures by Fellows and Associates

Chairperson
Janendra K Batra, NICHDR, New Delhi



Santosh Chauhan

CCMB, Hyderabad

Santosh Chauhan is a Faculty Member at the CSIR-Centre for Cellular and Molecular Biology (CCMB) in Hyderabad, India, who works in the area of innate immunity, autophagy, and cellular stress responses. After earning his PhD from the All India Institute of Medical Sciences (AIIMS), New Delhi, and completing postdoctoral fellowships at the MD Anderson Cancer Center and the University of New Mexico, he established his independent research group at the Institute of Life Sciences (ILS), Bhubaneswar, in 2015, before joining CCMB in 2022.

One of the important discoveries from his group is the characterization of Programmed Cell Revival (PCR), a new biological phenomenon. His work demonstrates that cells can actively recover from advanced, structural stages of cell death. In physiological contexts, this survival mechanism is tied to wound healing, developmental acceleration, and the maintenance of cellular stemness.

The cornerstone of his laboratory's work is the dissection of cellular autonomous defense mechanisms, where he has made seminal contributions to understanding how the immunity-related GTPase M (IRGM) acts as a master regulator of inflammation, autophagy, and interferon signalling to combat infections and auto-inflammatory diseases.

He is an EMBO Global Investigator and an elected Fellow of INSA and NASI.

He was elected as a Fellow of the Indian Academy of Sciences in 2023.

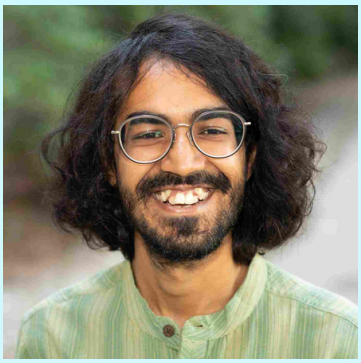
Programmed Cell Revival: Redefining the Borders of Cellular Life, Death, and Tissue Regeneration

For decades, commitment to cell death was viewed as a one-way path. However, recent paradigms reveal that cells can orchestrate remarkable recovery processes from the brink of imminent death. Our work has introduced the concept of “Programmed Cell Revival”, a tightly regulated, cell-intrinsic survival mechanism activated after severe homeostatic stress. Using multi-omics profiling and diverse animal models, we demonstrate that when cells face near-lethal injury from lysosomotropic challenges, they trigger a biphasic transcriptional programme. The initial phase opens chromatin accessibility to upregulate pathways crucial for stemness, embryonic development, and inflammation. This is followed by a metabolic and structural overhaul that achieves complete cellular renewal. Crucially, harnessing this intrinsic survival programme in vivo significantly accelerates skin wound healing, corneal repair, and tissue regeneration across various species. By challenging the traditional dogma of irreversible cell death, these findings establish Programmed Cell Revival as a physiological mechanism for tissue repair, opening innovative, host-directed avenues in regenerative medicine.

4 July 2026 (Saturday)
12:50–13:10 PM

Session 2B:
Inaugural Lectures by Fellows and Associates

Chairperson
Janendra K Batra, NICHDR, New Delhi



Akshit Goyal
ICTS, Bengaluru

Akshit Goyal is a faculty member in Biological Physics at the International Centre for Theoretical Sciences. His research focuses on understanding the collective dynamics of evolving ecosystems using tools from dynamical systems, non-equilibrium statistical physics, data assimilation, and information theory.

He obtained his BSc (Honours) in Physics from St. Stephen's College, New Delhi, and earned his PhD in Biophysics from the National Centre for Biological Sciences, Bengaluru. Following his doctoral studies, he was a Physics of Living Systems Postdoctoral Fellow at the Massachusetts Institute of Technology, USA, from 2019 to 2023.

His research aims to uncover the principles governing ecological and evolutionary dynamics by integrating theoretical, computational, and data-driven approaches across disciplines.

He was selected as an Associate of the Indian Academy of Sciences in 2026.

Towards a Theory of the Evolution of Ecosystem

Ecological interactions can dramatically alter evolutionary outcomes in complex communities. Yet, the framework of population genetics largely neglects interactions within species-rich communities. Here, we bridge this gap by using dynamical mean-field theory to integrate community ecology into classical population genetics models. We show that ecological interactions result in emergent frequency-dependent selection between parent and mutant types, characterized by a single parameter that measures the strength of ecological feedback. Population genetics models incorporating frequency-dependent selection can therefore predict mutation outcomes not only in simple two-species settings but also in complex multispecies communities.

Using this framework, we derive an analytical expression for fixation probability analogous to Kimura's formula and examine its behaviour under various ecological and evolutionary limits. We find that ecological interactions suppress fixation probabilities for moderately beneficial mutants relative to Kimura's predictions, with the suppression becoming stronger for larger effective population sizes, greater selective differences between parent and mutant types, and ecosystems containing many “open niches” (i.e., operating well below packing bounds). Frequency-dependent selection also gives rise to prolonged parent–mutant coexistence in complex communities. This study establishes a framework for integrating ecological interactions into population genetics and demonstrates that complex communities can influence evolutionary outcomes in surprisingly simple ways.

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