N MUKUNDA
Indian Academy of Sciences, Bengaluru

The marvel and the mystery of quantum mechanics – Some reflections

The creation of quantum mechanics is one of the most dramatic developments in the physics of the 20th century. After the period 1900–1924, during which the Law of Black Body Radiation, wave-particle duality for light and for matter, the general quantisation of energy and stability of matter and the laws of spectroscopy had begun to be understood, the mathematical structure of quantum mechanics was discovered amazingly rapidly in just under two years, 1925–1927. On the other hand, the physical interpretation and meaning of this structure required an enormous effort, in which the uncertainty and complementarity principles, the Born probability interpretation and rule and the wave function collapse idea, all played important roles. While quantum mechanics has all along been amazingly successful in numerous applications, many puzzling questions about interpretation remain and continue to be pursued till today, though the focus has shifted from wave-particle duality to entanglement and its signatures and consequences. This brief talk will try to give an impressionistic account of these developments, accompanied by comments on the origins of human intuition and the meaning of human understanding of nature.

SPEAKER'S PROFILE

N Mukunda started his career as a Fellow in 1967 at TIFR, Bombay and then moved to IISc, Bangalore as Reader in 1969. He served as a Professor at Centre for Theoretical Studies during 1972–2001. His expertise is in Theoretical Particle Physics, Mathematical Physics, Mechanics and Theoretical Optics. He is associated as a Member, Indian Physics Association, Indian Association for General Relativity and Gravitation, Fellow, INSA and National Academy of Sciences. He is the recipient of Eastman Kodak Graduate Award 1962, Bhatnagar Award 1980, Meghnad Saha Award 1985, Jawaharlal Nehru Fellowship 1987–89; and Sir M Visvesvaraya State Senior Scientist Award 2003.

His contributions to science include Representation theory of Lorentz, Poincare and other non-compact groups, Majorana and other relativistic wave equations, Fourier optics, Hamiltonian theories, Quantum mechanics and optics, Classical dynamical formalism, etc. N Mukunda was elected as Fellow in 1975.

RUPINDER KAUR

Centre for DNA Fingerprinting and Diagnostics, Hyderabad

An analysis of *Candida glabrata*–host interaction

Hospital-acquired fungal bloodstream infections (BSIs) pose a serious clinical challenge. *Candida* species are the leading cause of fungal BSIs with an average mortality rate of about 40%. Among *Candida* species, *Candida glabrata* accounts for upwards of 25% of total *Candida* BSIs. *C. glabrata* is a haploid budding yeast, which resides as a commensal in the normal human microflora. However, it also possesses the ability to disseminate and cause disease in several host organs in immuno-compromised individuals. Treatment of *C. glabrata* infections is particularly challenging as *C. glabrata* is intrinsically less susceptible to widely used azole antifungals and acquires resistance rapidly upon antifungal exposure. The speaker's research is focussed on a better understanding of pathogenicity determinants of *C. glabrata* with special emphasis on antifungal drug resistance mechanisms and interaction with host immune cells. He has shown that *C. glabrata* survives and multiplies in murine and human macrophages by evading the host immune response and remodelling its own carbon metabolism and chromatin architecture. He has also uncovered essential iron homeostasis mechanisms that help *C. glabrata* establish itself as a successful pathogen. These findings along with the novel determinants of antifungal tolerance in *C. glabrata* will be presented.

SPEAKER'S PROFILE

Rupinder Kaur has completed her Master's degree in Biotechnology from the Guru Nanak Dev University, Amritsar and PhD with Dr Anand K Bachhawat at the Institute of Microbial Technology, Chandigarh. After doing postdoctoral research at Harvard Medical School and Johns Hopkins School of Medicine, she returned to India and joined the Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad as a staff scientist. She has been awarded the Innovative Young Biotechnologist Award, National Women Bioscientist Award and Wellcome Trust/DBT India Alliance Senior Fellowship. Her current research is centred on the study of virulence traits and antifungal drug resistance mechanisms in the opportunistic human fungal pathogen Candida glabrata. Rupinder Kaur was elected Fellow in 2019.

RISHI RAJ
Indian Institute of Technology, Patna

Development of two-phase heat sinks for earth and microgravity thermal management applications

Boiling utilizes the latent heat of vapourization of a fluid to enable high heat transfer in applications such as cooling of electronics, cryogenic fuel storage, refrigeration and air conditioning. However, boiling behaviour is altered and the advantage of high heat transfer on earth is lost due to absence of buoyancy-induced bubble removal in zero gravity of space. In this regard, the speaker has developed a passive bubble removal mechanism, which uses surfactants found in soaps and detergents to facilitate more than 4x enhancement in heat transfer in comparison to boiling with pure water. This strategy is currently being implemented in a two-phase heat spreader for hot spot mitigation in spacecrafts. Similarly, boiling in the confinement of microchannels does not allow easy bubble removal even on earth. In this regard, he has developed an ingenious pulse dampener, which adaptively removes the excess vapour generated in the microchannels. This strategy allows relatively high heat transfer (~MW/m^2) in comparison to the typical heat sinks without pulse-dampener (~500 kW/m^2). The pressure drop penalty is also small in comparison to the other state-of-the-art technologies.

SPEAKER'S PROFILE

Rishi Raj is an Assistant Professor in the Department of Mechanical Engineering at IIT Patna. He received his B.Tech. degree from IIT Guwahati in 2006 and a PhD from the University of Maryland College Park in 2010. Prior to joining IIT Patna in 2013, he was the Battelle Postdoctoral Fellow in the Device Research Laboratory at MIT. His group investigates thermal and fluid transport during the liquid–vapour phase change for various energy, water, and thermal management applications. His work has been acknowledged with the 2018 INAE Young Engineer Award and various best papers awards in conferences and workshops, among others. Rishi Raj was selected Associate in 2018.

AMIT KUMAR
Indian Institute of Technology, New Delhi

Online algorithms for packing and covering problems

Online algorithms are used to model problems where the input is revealed over time and the algorithm needs to make irrevocable decisions. Packing and covering problems are a large class of combinatorial optimization problems. In this talk, the speaker will describe some recent models for these problems, which study the trade-off between the quality of the solution and the extent to which the notion of 'irrevocability' can be violated.

SPEAKER'S PROFILE

Amit Kumar is a Professor in the Department of Computer Science and Engineering at IIT Delhi. He holds a B.Tech. degree from IIT Kanpur and PhD from Cornell University. He was a member of technical staff at Bell Laboratories, Murray Hill during 2002–03, and has been a faculty member at IIT Delhi since 2003. His research lies in the area of combinatorial optimization, with emphasis on problems arising in scheduling, graph theory and clustering. He has received IBM Faculty Award (2005), INAE (Indian National Academy of Engineering) Young Engineer Award (2006) and INSA (Indian National Science Academy) Medal for Young Scientists (2011). He is a Fellow of Indian Academy of Sciences and has received the Shanti Swarup Bhatnagar Award for mathematical sciences (2018). Amit Kumar was elected Fellow in 2019.

DEVANJAN SINHA

Banaras Hindu University, Varanasi

Molecular chaperones as gateways to mitochondrial health

Mitochondrial dysfunction has lately been appreciated as a major causal factor in a myriad of diseases. For its function, a typical mitochondrion requires around 1500–2000 proteins. However, the mitochondrial genome is highly gene-deficient and most of the mitochondrial proteome is nuclear encoded. Therefore, the system has developed a robust transport mechanism, which involves coordinated recycling of Hsp70 (heat shock protein 70) machinery at the transport channel. In lower organisms, these transporters are limited to their primary import role. But in higher organisms, the speaker found that the transport machinery is highly specialized with dedicated machines present for constitutive and regulated functions. Particularly the J-proteins, which are major drivers of Hsp70 functions have evolved multifunctionality and influence, other than protein transport, other cellular processes such as cell proliferation, redox maintenance, responses to xenobiotic drugs etc. Indeed, these J-proteins have been found to be overexpressed or mutated in different pathophysiological conditions such as cancer and cardiomyopathies. Their initial findings provide some hints on how these J-proteins might be hard-wired into the cellular systems, thereby furthering our understanding of these multifunctional entities.

SPEAKER'S PROFILE

Devanjan Sinha is an Assistant Professor at the Department of Zoology, Banaras Hindu University. He completed his PhD from Department of Biochemistry, Indian Institute of Science, Bangalore. His major areas of interest include mitochondria and stress biology, and molecular chaperones– in the context of their role in health and diseases. He has been awarded the INSA Young Scientist Medal 2017, NASI-Young Scientist Platinum Jubilee Award 2017. He is a DST-INSPIRE Faculty fellow (2014). Devanjan Sinha was selected Associate in 2017.

RAJEEV PATNAIK

Panjab University, Chandigarh

Reconstructing diet and environment of ancient mammals of India using stable isotopes and microwear

Mammalian dental enamel being the hardest biological tissue made up of bioapatite stays unaltered for millions of years. Tooth enamel grows periodically and has the potential of preserving the history of development of the individual and species. The rhythmic growth increments called as the 'Retzius lines' outcrop on the tooth enamel surface as perikymata and preserve a continuous record of temporal isotopic changes along the growth axis of a tooth. The carbon isotope composition ($\delta^{13}C$) of tooth enamel in modern herbivores distinguishes between diets dominated by C^3 plants (dicots including trees, shrubs, herbs, forbs) and cool season (high latitude or altitude) grasses or sedges, and those dominated by C^4 plants (mostly monocots, such as warm-season grasses and sedges). $\delta^{18}O$ of enamel, in turn, provides information about the water intake, temperature and rainfall. Study of extinct early primates from India reveals that they were primarily browsers, whereas later forms were grazers. Rats and mice also show similar trends, whereas hypsodonty and isotopes in elephants show shifts in their diets several times in the geological history.

SPEAKER'S PROFILE

Rajeev Patnaik has adopted a multidisciplinary approach (stable isotopes, dental microwear, microstructure, cladistics, etc.) to address issues concerning Neogene-Quaternary climatic conditions, mammalian ecology, diet, biogeography, chronology and evolution. He and his colleagues carried out cladistic analyses of the Narmada cranium, the only hominin found from India till date, showing a closer relationship to the European Steinheim specimen. He also discovered new hominoids/primates, ostrich-like eggshells, new pelican and darter fossils from the Siwaliks; Late Cretaceous rice from central India; and Miocene mammals from the Baripada Beds of Odisha. In 2016, he was awarded the prestigious National Geoscience Award by the Honourable President of India. Rajeev Patnaik was elected Fellow in 2019.

MANDAR M DESHMUKH

Tata Institute of Fundamental Research, Mumbai

Studying the flow of electrons in 2-D materials

2-dimensional materials are of great interest in fundamental science and applications. There have been extensive studies on monolayer graphene where unique properties result from the symmetry of the honeycomb lattice. Few layer graphene systems are of interest as they offer interesting opportunities to study the effect of electronic interactions while monolayer graphene was largely understood in terms of independent electron picture. In addition, few layer graphene offer an opportunity to break simple symmetries and study their consequence.

SPEAKER'S PROFILE

Mandar has been a faculty member at the Tata Institute of Fundamental Research, in Mumbai, since January 2006 in the Department of Condensed Matter Physics and Materials Science and is currently a professor. His area of research is nanoscale physics. Before coming to TIFR, he was a postdoctoral researcher at Harvard University in the US. Prior to that, he got his PhD in Physics from Cornell University in the US. He was an undergraduate student at IIT Bombay and graduated from IIT with a BTech in Engineering Physics. Mandar M Deshmukh was elected Fellow in 2019.

ROHINI GARG

Shiv Nadar University, Gautam Buddha Nagar

Studying plant environment interactions through the lens of epigenomics

Drought and salinity are the major factors that limit crop production worldwide. In response to various stresses, plants evoke some common and stress-specific signature pathways that enable plants to discriminate between different stimuli and respond in unique ways. The speaker studies epigenomic differences between different crop genotypes and their regulation under different abiotic stresses, via generation of DNA methylome and transcriptome maps and identification of differential methylation patterns in rice and chickpea cultivars with contrasting phenotypes under control and stressed conditions. These analyses provide clues to the epigenomic regulation of abiotic stress response and adaptation in crop plants. She has also identified genotype-specific and stress-regulated small RNAs and miRNAs in these genotypes of rice and chickpea to dissect the gene regulatory network involved in drought and/or salinity stress response. These studies enable identification of several candidate genes and metabolic pathways involved in abiotic stress responses/adaptation regulated by epigenetic mechanisms that can be used as epialleles for crop improvement.

SPEAKER'S PROFILE

Rohini Garg is currently Assistant Professor at Shiv Nadar University, Gautam Budh Nagar, UP. Her area of research includes epigenomics and transcriptomics research for climate resilient crop plants. She was an INSPIRE Faculty Awardee at NIPGR after completing her PhD from National Institute of Immunology, New Delhi and Masters in Plant Molecular biology from the University of Delhi, South Campus. She is a recipient of SERB Women Excellence Award (SERB-WEA) from the SERB, DST, Young Scientist Platinum Jubilee Award (2014) from the National Academy of Sciences India (NASI), Indian National Science Academy (INSA) medal for Young Scientist (2014), Innovative Young Biotechnologists Award (2012) from the Department of Biotechnology, Government of India and INSPIRE Faculty Fellowship (2011) from the Department of Science and Technology, Government of India. She is also a member of INYAS. She has around 37 publications in reputed international Journals like Plant Physiology, Plant Journal, Plant Biotechnology Journal etc. Rohini Garg was selected Associate in 2016.

SMRITI MAHAJAN
Indian Institute of Science Education and Research, Mohali

Evolution of galaxies in the cosmic-suburbs

Star formation is vital for the growth of galaxies and structures in the Universe. But the rate at which a galaxy forms stars is determined by several factors, such as its mass, age and environment, where the environment is often characterized by the number density of objects in the vicinity of a galaxy. In this talk, the speaker will show that the intermediate-density environment prevalent in the large-scale filaments are crucial for the evolution of galaxies. She will present a case study of the Coma supercluster, where she used different techniques to characterize the environment into clusters, filaments and voids in order to examine the multi-wavelength properties of galaxies as a function of their environment. Her results show that galaxies become passive not only as they approach the nearest cluster, but also as they approach the spine of the filaments. Her observations suggest that filaments are crucial to the evolution of galaxies in the nearby universe.

SPEAKER'S PROFILE

Smriti Mahajan is an observational astrophysicist, specialising in evolution of galaxies. She did her PhD from the University of Birmingham, the UK, in 2011, followed by post-doctoral research at the Harvard-Smithsonian centre for astrophysics, USA and the University of Queensland, Australia. Currently, she is a DST-SERB INSPIRE Faculty fellow employed at IISER Mohali. Smriti Mahajan was selected Associate in 2018.

JAGANNATH MONDAL

Tata Institute of Fundamental Research, Hyderabad

Computer simulation of biomolecular recognition at atomistic precision and in real time

Underlying the drug discovery, there exists the critical process of molecular recognition of ligand by the target protein. However, computational approaches on molecular recognition have heavily relied on docking-based techniques whose accuracies are limited by sampling issues. His research group has undertaken a completely different approach where they attempt to capture the entire process of ligand diffusing to the protein cavity at atomistic resolution and in real time. So far, they have successfully applied this approach to two protein/ligand system, namely T4 Lysozyme/benzene and cytochrome P450/camphor. In both cases, they have been able to simulate the complete process at crystallographic accuracy and at correct kinetics. The ligand binding pathways that emerge from these simulations are novel and shed light on the atomistic mechanism involving complete biomolecular recognition.

SPEAKER'S PROFILE

Jagannath Mondal is a computational biophysicist at TIFR Hyderabad. He completed his B.Sc. in Chemistry at Calcutta University in 2004 and M.Sc. in IIT Kanpur in 2006. He earned his PhD at University of Wisconsin Madison, USA (Research Advisor: Arun Yethiraj) in 2011. He pursued his postdoctoral research at Columbia University, USA (Research Advisor: Bruce J. Berne) during the period of 2011–2015. Subsequently, he joined Tata Institute of Fundamental Research, Hyderabad in July 2015 and is currently serving as a Reader. His research interest involves computer simulation of chemically and biologically relevant processes. The current research project in his group ranges diverse topics including dynamics of biomolecular recognition at real time, optimization of collective variables and cellular biological processes. He is a Ramanujan fellow. Jagannath Mondal was selected Associate in 2016.

BEULA CHRISTY
L V Prasad Eye Institute, Hyderabad

Teaching science to students with visual impairment

Students with vision loss are not exposed to or instructed in the subject of science as often as others, as it is perceived as a visual subject. Several challenges involved in educating them in this field have collectively posed limitations for students with vision loss to pursue science as their subject. Together these challenges delude one into believing that discouraging them from studying science are in their best interest. Several comparison studies found the cognitive abilities of students with vision loss are within the same range as sighted students. Facilities such as availability of teaching materials in an accessible format, accommodations in laboratory procedures, teachers training program, etc., will help them achieve the value of science as a meaningful tool to comprehend, explain and make sense of their surroundings. The Sarva Shiksha Abhiyaan and the Right of Persons with Disabilities Act, 2016 guarantees reservations for persons with vision loss in educational institutions.

SPEAKER'S PROFILE

Beula Christy, a PhD in vision science from University of New South Wales (UNSW), Sydney, has trained international agencies like Bartimeus and Perkins on early intervention of those with multiple handicaps. She has a bachelor's degree in special education followed by a post-graduation in rehabilitation science from Holy Cross College in Tiruchirappalli, Tamil Nadu. This was followed by a postgraduate diploma in guidance and counselling from Annamalai University, Tamil Nadu. She also has an additional degree in B.Ed. from Bhoj University, Madhya Pradesh. As part of community outreach initiatives, she has worked in Community Based Rehabilitation (CBR) projects in rural Andhra Pradesh. She was awarded with a gold medal and Sr. Elizabeth Rose Best Rehabilitation Worker Award in 1999 from Holy Cross College, Tamil Nadu, for her outstanding performance in community works. Over the years, she has made several presentations at national and international conferences and has several publications to her credit. Her area of interest is early intervention, particularly in children with vision impairment and multiple disabilities.

TONY JOSEPH

Author/Former Editor, Business World, New Delhi

The four prehistoric migrations that shaped Indian demography and population structure

Recent advances in population genetics, especially in sequencing DNA from people who lived thousands or tens of thousands of years ago, have brought much clarity to how populations were formed in many parts of the world. This lecture will combine evidence from these ancient DNA studies, along with findings from other disciplines including archaeology and linguistics, to try to paint a cohesive picture of the way Indian population was formed out of four major migrations: the out-of-Africa migrants who reached India around 65,000 years ago; the West Asian migrants from the Zagros region of today's Iran, who arrived around 9000 years ago; the East Asian migrants who brought Austro-Asiatic languages to India around 4000 years ago; and the migrants from the central Asian Steppes who brought Indo-European languages to India between 4000 and 3000 years ago. The speaker will touch upon the questions that are yet to be answered relating to Indian demography and population structure.

SPEAKER'S PROFILE

Tony Joseph, author of 'Early Indians: The Story of Our Ancestors and Where We Came From', has been an editor and a journalist for over three decades. During his long career, he has been Features Editor of The Economic Times, Associate Editor of Business Standard and Editor of the Businessworld magazine when it was owned by the ABP group. Tony has been focussed on researching India's prehistory during the last six years, and 'Early Indians – The Story of Our Ancestors and Where We Came From' is the result of that. As part of the research, he visited many prehistoric sites in India and talked to scientists and academics who are deeply involved in expanding our frontiers of knowledge in History, Archaeology, Linguistics, Population Genetics, Philology and Epigraphy. The book has gone into the fifth reprint in the fifth month of its publication and has been received well by the academic community. He is currently working on the next book, which will focus on the periods that immediately followed the prehistoric migrations.

POORNIMA PAIDIPATY
London School of Economics, UK

Statistics with 'A clearly defined purpose': A brief history of sampling and economic planning in Nehruvian India

PC Mahalanobis is remembered for his numerous personal contributions to the science of statistics, as well as his leadership in the field (as an educator, institution builder and national planner). As his long-time colleague, C R Rao reminds us however, Mahalanobis's commitment to statistics was not merely driven by scholarly interest. For him, the collection and analysis of data were meant to serve a greater purpose. These activities would assist in a wider effort to develop and uplift the Indian economy in the aftermath of colonial rule. This talk will examine some of the problems planners and experts faced in developing national income accounts, gauging living standards and encouraging macroeconomic growth. In the process, the speaker will examine how Mahalanobis and his colleagues at the ISI developed pathbreaking techniques in large-scale sampling and macroeconomic measurement, placing them at the forefront of international developments in both science and social policy.

SPEAKER'S PROFILE

Poornima Paidipaty is currently an LSE Fellow in Inequalities. She received her Ph.D. in Anthropology from Columbia University. Her work examines the intersections of decolonisation, governance and modern social science. She helped lead and organize the Measures of Inequality project at Cambridge University, which explores how metrics and statistical frameworks have been central to our historical and political understanding of equity and fairness. This work is part of an ongoing interest in large-scale state sciences (logistics, cartography, statistics, demography and engineering) and their historical implications for economic disparity and democratic politics in South Asia. She is currently writing a book on the history of large-scale sampling and state-builidng in Nehruvian India. Prior to the LSE, Dr. Paidipaty was the Philomathia Fellow in History at Cambridge and a member of the Society of Fellows at the University of Chicago.

PROBAL CHAUDHURI

Indian Statistical Institute, Kolkata

From Mahalanobis distance to fractile graphs via sample survey

Prasanta Chandra Mahalanobis was an 'accidental' statistician. In this talk, the speaker shall narrate the 'accidents' in Mahalanobis' life that are responsible for three of his major contributions in statistical science. He will do it along with a quick review of some of the fundamental concepts and innovative methods that he developed.

SPEAKER'S PROFILE

Probal Chaudhuri is a Professor at Indian Statistical Institute, Kolkata, and is working there since 1990. He is a fellow of all three science academies in India and the Institute of Mathematical Statistics in the US. He is a recipient of the C R Rao National Award in Statistics, the B. M. Birla Science Prize and the Shanti Swarup Bhatnagar Prize. Probal Chaudhuri was elected Fellow in 2003.

PARTHA P MAJUMDER
National Institute of Biomedical Genomics, Kalyani

Mahalanobis, anthropometric diversity and the birth of human genetics in India

Prasanta Chandra Mahalanobis analyzed large volumes of anthropometric data when he was founding statistical science in India. This experience enabled him to devise many innovative statistical methods and measures, notably D2. He also obtained seminal insights into the diversity, affinities and structures of ethnic populations of India. However, anthropometric data did not provide the kind of insights he was seeking. Therefore, he initiated genetical studies in the Indian Statistical Institute (ISI). He received strong support from many internationally renowned scientists to initiate human genetics in ISI. His legacy has lived on and has gained strength over the years. ISI has made many seminal contributions to the understanding of structures and histories of Indian ethnic populations using genetical methods. This lecture provides a historical perspective of the contributions of Mahalanobis and his legacy in this domain.

SPEAKER'S PROFILE

Partha Pratim Majumder, is known for his contributions in the field of genetics and statistics. Better known as the 'Gene guru' across media, one of his major interests is human evolution and he has worked extensively to uncover genetic architecture behind disease susceptibility/ drug response. Researching statistical applications and developing algorithms is another part of his passionate and brilliant genius. Dr. Majumdar's BSc. Stat. (Hons.) degree in ISI paved the way to Master's and PhD. This platform encouraged him to think quantitatively and provided exposure to the world of statistical methodologies. For him, the transition from a background in statistics to research in genetics came quite naturally. He also completed courses in Biochemistry, Cell Biology and Molecular Biology, and was a post-doc at the Center for Demographic and Population Genetics, University of Texas, USA before he began his research in population genetics. While many can't multi-task he was simultaneously a graduate student and a post-doctoral researcher! He has also served as a Visiting professor and then as a Genetics Consultant at the Department of Biostatistics and Human Genetics, University of Pittsburgh. He has been honored with several fellowships and medals, including the New Millennium Science gold medal, for his contributions in research. He is a staunch believer in Population genetics paving the way for a healthier life. Partha P Majumder was elected Fellow in 1998 and is its current President.

B N GANGADHAR

National Institute of Mental Health and Neuro Sciences, Bengaluru

Neuroscience of yoga in psychiatry: Treatment of depression

Therapeutic applications of yoga have come to stay in Psychiatry, albeit not universally used. Individual components of yoga have demonstrable neurophysiological effects of deactivating certain emotional centres [limbic grey matter] in healthy subjects. The speaker postulates a theoretical model as follows.

Depression as a disorder is produced by hyperactivation of limbic centres. This results in a relative lowering of GABA tone and elevation of cortisol through disinhibition of the HPA axis. Lowered cortisol reduces neuro-protection through reducing BDNF, consequently, resulting in the loss of grey matter [chita dahati nirjeevam, chinta dahati jeevanam]. In this context, the yoga effects can be linked to having actions on the corresponding loci; deactivation of limbic nuclei; elevation of GABA tone, reduction of cortisol and in turn elevation of BDNF. Indirect evidence of neuroprotection comes from the normalization of P300 amplitude. As direct evidence, six months of yoga practice in a group of elderly individuals with mild cognitive impairment led to an increase in hippocampal grey matter. In summary, the neurobiological effects of yoga, are in support of its antidepressant effects. Demonstration of above-mentioned postulates in a single comprehensive study deserves support.

SPEAKER'S PROFILE

B N Gangadhar has been serving as the Director (since January 2016) and Professor of Psychiatry at NIMHANS. He completed his MBBS in 1978 (Bangalore Medical College), MD Psychiatry in 1981 (NIMHANS), DSc (Doctor of Science) from SVYASA University for research work of Yoga and Mental Health in 2012.

He has served as Honorary Dean, Life Sciences at SVYASA Yoga University, Bangalore (from 2013), Adjunct faculty on Consciousness at National Institute of Advanced Studies (from 2014); President of the Indian Psychiatric Society, Karnataka Chapter (2012–13); Visiting Fellow (IBRO), Vienna, Austria (1987–88); Consultant to WHO for inspection of Tsunami relief projects 2008. He is presently on the expert committees of DST and on the national AYUSH committee for integrative medicine. He is the recipient of the coveted Sir CV Raman Award and Doctors Day Award from the Government of Karnataka. He has also shared over 25 awards with other primary recipients. B N Gangadhar was elected Fellow in 2019.

SUBI J GEORGE
Jawaharlal Nehru Centre For Advanced Scientific Research, Bengaluru

Fuel-driven temporal supramolecular polymers

Living supramolecular polymerization has emerged as a synthetic strategy to construct supramolecular assemblies with well-defined structure and dispersity. On the other hand, temporal control over dynamic materials is now being extended to the non-equilibrium regime. The synergy between structural and temporal control is important for the advent of supramolecular polymers to be employed as functional adaptive materials. To gain this symbiosis it is imperative that a common strategy is sought.

The speaker is currently trying to develop and study a chemical-fuel controlled supramolecular system that not only follows living supramolecular aggregating regime but also can be regulated temporally through various molecular cues.

This talk describes his efforts in understanding this very key concept of biological self-assembly, which has temporal control over supramolecular polymerization via a chemical fuel as he thinks this approach can singlehandedly cater to various existing challenges of supramolecular chemistry such as a living supramolecular polymerization, control over nucleation rate, transient materials and formation of supramolecular block hetero-structures.

SPEAKER'S PROFILE

Subi George is an Associate Professor at the New Chemistry Unit of JNCASR, Bangalore, India. George is a Supramolecular Chemist and his current research interests focuses on Functional supramolecular polymers, living and non-equilibrium supramolecular polymerization. He is the recipient of Swaranjayanti Fellowship from DST (2017), Asian Photochemistry Association Young Scientist award (2015), NASI-SCOPUS Young Scientist Award in Chemistry (2015), CRSI Bronze Medal (2015) and MRSI Medal (2013). He is a member of Editorial Advisory Boards of Chemistry of Materials, Material Horizons and Cell Chem. Subi George was elected Fellow in 2019.

SULOCHANA GADGIL
Pune

Physics of the monsoon and its variability

While the surface winds over a large part of the tropical regions (the trade winds) blow in the same direction throughout the year, over some parts known as monsoonal regions, they blow in opposite directions in different seasons. This large seasonal variation of winds is considered to be the distinguishing attribute of the monsoon, but it is the monsoon rainfall, with large impact on agriculture and economy, that governs the pulse of life in our country.

Understanding the physics of the monsoon and its variability, which is a prerequisite for the development of models capable of skillful predictions, has evolved since the seminal paper by the astronomer Halley (1686) who suggested that the monsoon was a planetary scale land-sea breeze. This theory is still found in textbooks and used even in scientific papers, despite scientific evidence being presented against it. The speaker shall talk about the present understanding of the physics of the monsoon, arising from combining the major advances in the knowledge of tropical cloud systems with the availability of satellite imagery adding to the already rich knowledge of the observed monsoon variability, with new theoretical insights into the physics of tropical cloud systems since the 1960s.

SPEAKER'S PROFILE

Sulochana Gadgil is one of the world's leading monsoon meteorologists, known for significant contributions to the understanding of Indian monsoon and its variability, and farming strategies for the variable climate. Trained at Harvard and MIT, and then working for 35 years at the Indian Institute of Science she has conducted research at the cutting edge of science, as also of social relevance for India. With her rich and manifold contributions, she has been elected to fellowship of IASc, INSA and I MET Soc. She is a recipient of Norman Borlaug Award and Life Time Excellence Award of Ministry of Earth Sciences. Sulochana Gadgil was elected Fellow in 1985.