

Twelfth Programme

April 5, 2018

"Gender Equality –is it possible! & The Price of Advancement"

Speakers:

Dr Pramathes Das Mahapatra

**D.G.O., M.D., M.R.C.O.G., F.R.C.O.G. (Lond), F.R.C.S. (Edin), F.R.C.S (Glasgow)
Director, Spectrum Clinic And Endoscopy Research Institute, Kolkata**

"Gender Equality –is it possible!"

Speakers:

Dr. Protyush Chatterjee

Consultant Orthopaedic Surgeon & Past President West Bengal Orthopaedic Association, Kolkata

The Price of Advancement

Eleventh Program

February 23, 2018

"Statistical study of a transition in connectivity and some real life examples"

Speakers:

Dr. Sujata Tarafdar

Condensed Matter Physics Research Centre, Jadavpur University

"The Island - Mainland (IM) transition - Speaker"

Speakers:

Dr.Tajkera Khatun

Asst. Prof. Charuchandra College

Connectivity of crack patterns in desiccating clay: an example of IM transition

Abstract:We discuss Island-Mainland (IM) transition [1] on a square lattice where black squares are randomly deposited on a white layer with concentration p . As we increase p , at a certain p the black islands in white sea (IS) phase crosses over to the mixed phase (MP) where white sea breaks into lakes. In MP phase black island and white lakes coexist together. With increasing p black islands coalesce to form mainland. At some larger p MP phase crosses over to the lakes in mainland (LM) phase. We define Euler number as the difference between the number of white clusters and the number of black clusters. Euler number shows the points of extrema near the transition points. IM transition is supported by the connectivity of crack patterns in desiccating clay.

The crack pattern depends on the thickness h of the clay layer [2]. There is a critical cracking thickness below which no cracks appear. After critical cracking thickness isolated cracks appear randomly. As the thickness of the film increases further cracks start to form connected network. At critical thickness cracks first form fully connected network. Regions of clay layer bounded by cracks on all sides defined as peds now appear. After critical thickness with increase in the thickness of the clay layer crack width increases and number of peds decreases. Here, if we define Euler number as the difference between the number of peds and the number of cracks and Euler number is calculated for different layer thickness, it showed a minimum at the thickness where completely connected network forms first. In analogy to IM transition here we have the phases- isolated cracks in the sea of clay and peds in the regions between fully connected cracks.

Speakers:

Dr. Tapati Dutta

Assoc. Prof. and Dean of Science, St. Xavier's College

"IM transition in simulation of patterns in a drying droplet"

Abstract:We report a study on the kinetics of drying of a droplet of aqueous gelatin containing sodium chloride. The process of drying recorded as a video clearly shows different regimes of growth leading to a variety of crystalline patterns. Large faceted crystals of \sim mm size form in the early stages of evaporation, followed by highly branched multi-fractal patterns with micron sized features. We simulate the growth using a simple algorithm incorporating aggregation and evaporation, which reproduces the cross-over between the two growth regimes. As evaporation proceeds, voids form in the gel film. The time development of the fluid-void system can be characterized by the Euler number. A minimum in the Euler number marks the transition between the two regimes of growth.

Tenth Program

January 31, 2018

"Separation of a Substance from a Liquid for the Purpose of Recovery/Remediation and Associated Phenomena"

Speakers:

Prof. Amalesh Sirkar

Visiting Professor (part time) in Polymer Science and Technology Department of Calcutta University; and Formerly, Dean of Chemical Engineering, Food Technology & Biotechnology at Haldia Institute of Technology, Haldia

"Interfacial Phenomena in Liquid-Liquid Extraction"

Abstract:Interfacial Phenomena in liquid-liquid systems are mainly due to two types of interfacial instability namely, one Marangoni Instability and the other one Energy Instability. Marangoni instability is surface tension driven convective flow in the vicinity of the interface in both the phases, due to naturally occurring disturbance bringing in more solute from bulk to the interface at some locations along the interface, causing interfacial tension gradients along the interface, leading to higher mass transfer rates than that by molecular diffusion across the interface. Energy instability

occurs when specific energy of the driving force of mass transfer is greater than the free energy barrier of the interface. Surface tension driven flow, in general, is cellular convection and in extreme situation of large gradient of interfacial tension it leads to eruptions in both the phases. In Energy instability, in general, the phenomenon is unidirectional ejections from one phase to the other phase, appearing as a network of ejections in the shape of roots of a tree. In extreme situation of Energy instability there occurs a jerking of the whole interface followed by profuse ejections due to dynamic interfacial tension being zero. The increase in rates of mass transfer across the interface is much higher in Energy instability than in Marangoni instability. Energy instability can occur both in binary and ternary systems of mass transfer unlike Marangoni instability which occurs only in ternary systems.

Speakers:

Prof. Priyabrata Sarkar

Visiting Professor in Polymer Science and Technology Department of Calcutta University and Principal of Calcutta Institute of Technology, Ulberia

"Methods of Removal of Arsenic from Ground Waterh"

Abstract:Dissolved arsenic in contaminated groundwater is a major concern on a global scale due to its extreme toxicity. In this deliberation, I will report a number of techniques for detection and mitigation of arsenic and a few developed adsorbents with their performances. One of the adsorbents developed in our laboratory is magnesium oxide impregnated mesoporous alumina which was synthesized using biopolymer chitosan template. The packed column made of this adsorbent performed effectively over wide range of pH and exhibited a maximum adsorption capacity of 17.2 mg/gm for an initial arsenic concentration of 20 mg/l. The experimental data fitted well with pseudo-second order kinetics. The arsenic sorption capacity at breakthrough point was greatly influenced by bed depth. Once the column got exhausted, it was regenerated by eluting the bound arsenate [As (V)] with ~15 bed volume sodium hydroxide solution. It was observed that the adsorbent could retain its capacity up to five cycles of operation. Recently we have developed a metal-organic-framework (MOF) whose adsorption capacity is exceptionally high and it is being considered for online removal of arsenic in conventional water purifier.

Ninth Program

January 17, 2018

"Translational Cancer Research"

Speakers:

Prof. Ananda Mohan Chakrabarty

University of Illinois at Chicago, USA

"Bacterial protein and/or peptide in potential cancer therapy"

Abstract:This talk will deal with how certain bacteria have been known for more than 100 years to allow regression of cancer when such bacteria infect tumor-bearing patients. More recently our efforts have been directed to isolating the active bacterial proteins that allow such tumor regression

and develop chemically-synthesized peptide fragments retaining such anticancer activity for ultimate use as drugs.

Speakers:

Prof. Sharmila Sengupta

National Institute of Biomedical Genomics, Kalyani

"Insights on HPV16 related cervical cancer pathogenesis employing a genomics based approach"

Elucidation and understanding of the molecular landscape of cancer has facilitated the development of diagnostic, prognostic, and predictive biomarkers for clinical oncology. This has been possible through the advancements in next generation sequencing technologies and other global assays pertaining to analysis of the genome, epigenome, transcriptome and proteome. Cervical cancers are human papillomavirus driven and HPV16 positive cancers are the most prevalent worldwide as well as in India. We focused our attention on elucidating some of the intricacies of host pathogen interactions in such cancers employing a genomics driven approach. Such studies have significantly contributed to the identification of distinct HPV16-related molecular subtypes of cervical cancer that is critical for targeted screening, biomarker development for prevention and therapeutic decision-making.

Eighth Program

Decemember 12, 2017

" The Gene: code, components and complexity "

Speakers:

"Revisiting Genetic Code - Is it degenerate?"

Prof. A. S. Kolaskar

Vice Chancellor, The Neotia University, Kolkata

Speakers:

How does one dissect a complex trait into genetic components?

Prof. Saurabh Ghosh

Indian Statistical Institute, Kolkata

Participants

Tara Shankar Bhattacharya, Prof. Achintya Singha, Sreyan Raha, Dr.Bhaswar Ghosh, Kingshuk Chakravarty, Thurbu TshoingLepcha Amar Chandra Mahatha, Shreya Bagchi, Ayan Biswas, Arita Acharya, Baishali Acharya, Debayan Majumder, Prof. Partha Pratim Majumder, Idrani Bose, Prof. Bikas K Chakrabarti, Prof. Manikuntala Kundu, Prof. Joyoti Basu, Rajya Lakshmi, Prof. Parul Chakrabarti, Surekhi Lata

Seventh Program

November 23, 2017

" Dark Matter & its Detection: Indian Initiative "

Speakers:

Dark Matter : Why and What?

Prof. Pijushpani Bhattacharjee

SINP, Kolkata

Abstract: A variety of astronomical observations over the past several decades have firmly established that there exist large discrepancies between the dynamical estimates of the amount of gravitating mass in the Universe based on the usual Newton/Einstein dynamics and the amount of observed "visible" mass in the Universe. This so-called mass discrepancy (MD) exists on all astronomical length scales ranging from (sub)galactic scales all the way up to the largest scale structures seen in the Universe today. The universal cosmological average density of the visible matter can account for only about 15% of the total density of gravitating matter estimated from dynamical considerations. Independent cosmological observations and arguments provide strong reasons to believe that this additional invisible gravitating mass cannot be composed of normal baryonic matter (protons, neutrons) that all known matter is composed of. The most popular resolution of this MD problem hinges on the hypothesis of existence of "Dark Matter", a new form of matter that is electromagnetically inert (hence invisible) and permeates throughout the Universe. The physical nature of the constituent(s) of this hypothetical Dark Matter (DM), however, remains unknown till date. There exist a large number of ideas and suggestions as to the possible composition of the DM, all essentially based on new physics beyond the Standard Model of fundamental particle physics. In addition, alternative explanation of the MD problem in terms of the so-called MODified Newtonian Dynamics (MOND) (without the need for any DM) has also been suggested. In this talk we review the MD problem, the DM hypothesis and various suggested candidates of DM, and the basic ideas behind worldwide efforts towards detection of some of the suggested candidates of DM in laboratory experiments. Finally, we shall briefly discuss the basic ideas behind and issues with the MOND hypothesis of resolution of the MD problem.

Speakers:

Detectors and Detection Techniques for possible Dark Matter Search Experiment in India

Prof. Satyajit Saha

SINP, Kolkata

Abstract:Existence of Dark Matter (or the absence of it) has been an enigma that has puzzled the scientific community for quite some time. Many terrestrial experiments are going on searching for dark matter in the laboratory-based experiments. We have initiated our work towards setting up a dark matter search experiment at an underground location in India. Some of the experimental details, feasibility studies, radiation background survey and developmental work towards the experiment will be discussed in this talk.

Participants

Dr.Bhaswar Ghosh, Shyamsunder Mallick, Manas Datta, Smritikana Sarker, Prof. Sayantani Sarker, Prof. Kajari Lahiri, Prof. Jayati Basu, Prof. Manikuntala Kundu, Dr.Ferdausi Begum, Prof. Indrani Bose, Prof. Barun Kumar Chatterjee, Prof. Manashi Roy, Prof. Parul Chakrabarti, Rupa Sarkar, Prof. Amalesh Sirkar, Prof. Bikas K chakrabarti, Prof. Debasish Majumder, Prof. Pijushpani Bhattacharjee

Sixth Program

October 27, 2017

"Brain-Computer Interface (BCI)"

Speakers:

Mind Controlled Robots - A Science or A Myth

Prof. Amit Konar

Department of Electronics & Telecommunication, Jadavpur University

Abstract: The presentation would begin with a discussion on the brain response to external stimulation with an aim to decode subject's perceptual ability and motor-intentions to control external actuating devices. The later part of the presentation would deal with hybrid brain-computer interfacing, where two or more brain signals would be used to control a robot by brain commanded signals. The application areas to be covered include rehabilitative robotic limbs for people with neuro-motor disability, cognitive failure detection in driving, bypassing damaged brain lobes by artificial means, and many others.

Speakers:

BCI Technology and its Ethical Implications

Amita Chatterjee

Emeritus Professor, School of Cognitive Science, Jadavpur University

Abstract:BCI, short for Brain Computer Interface, Technology is the most potential technology of the twenty first century where science fictions seem to have come true. Put simplistically, BCI is a form of technology which uses brain signals to control devices in the external world. Both invasive and non-invasive forms of BCI have therapeutic and enhancement uses. With advancement in technology and commercialization of BCI products a number of ethico-legal issues have come to the forefront. Nijboer, Clausen, Allison and Haselager (2011) have listed seventeen such issues starting from obtaining informed consent from people with below-threshold consciousness through how to make responsible group decisions in matters of implanting BCI devices, issues concerning personality, personhood and its possible alterations, human dignity, mental integrity, neural data preservation protocols to mind-reading, mind control and privacy issues. It is high time for scientists, engineers, ethicist and regulators to work together to determine the ethical standards and to exercise sufficient techno-prudence in the future development and employment of BCI instead of giving in to imaginary techno-phobias.

Participants

Bhaswar Ghosh, Prof. Barun Kumar Chatterjee, Payal Pakrashi, Prof. Partha Pratim Majumder, Prof. Parul Chakrabarti, Prof. Bikas K Chakrabarti, Prof. Pradeep K Mohanty, Prof. Aniruddha Sinha, Prof. Rahul Banerjee, Prof. Indrani Bose, Prof. Krishna Bhattacharya, Prof. S.S. Bhattacharya, Somajit Dey, Prof. Jayashree Saha, Prof. Achintya Sinha, Supriya Khanra, Gargi Biswas, Prof. Amita Chatterjee

J C Bose Science Heritage Museum (JCBSHM) in academic collaboration with Cambridge University Press (CUP)

Fifth Program

September 1, 2017

"Dynamics of Social Behaviour and Phenomena On Networks"

Speakers:

Disease spreading on complex networks: Analysis of the Recent Ebola outbreak

Prof. Parongama Sen

Physics Department, Calcutta University

Abstract:Disease spreading on complex networks: analysis of the recent Ebola outbreak Abstract: Modelling the spread of epidemics on complex networks has led to a number of interesting results in the recent past. Starting with a brief overview, we discuss the characteristic features of the Susceptible-Infected-Removed (SIR) model considered on a network embedded in Euclidean space with random long range interactions, chosen following a certain prescription. The data for the Ebola outbreak that occurred in 2014-2016 in three countries of West Africa are analysed within a common framework using this model.

Speakers:

Bribe and Punishment: An Analysis of Harassment Bribery

Prof. Supratim Sengupta

Physical Science Department

Indian Institute of Science Education and Research, Kolkata

Abstract:Harassment bribes, paid by citizens to corrupt government servants for services the former are legally entitled to, constitute one of the most widespread forms of corruption in many countries. While some countries (like India) make both bribe-giver and bribe-taker equally culpable, others impose a higher penalty on the bribe-taker. Evolutionary game theory provides a powerful tool for analyzing such scenarios of social conflict. After giving a brief introduction to evolutionary game theory, I will examine the consequences of symmetric and asymmetric penalties on the proliferation of corruption using deterministic and stochastic evolutionary game theoretic models of bribery in well-mixed(unstructured) and network-structured populations. I will show how evolution of individual choices in a social conflict under different conditions and for different population structures affect the population dynamics, often in unpredictable ways, leading to profound consequences for the persistence and proliferation of bribery in society.

Fourth Program

August 14, 2017

"Magnetic Field Effects in Photochemistry"

The fourth programme in the Academic Discussion Series organized by J C Bose Science Heritage Museum in collaboration with Cambridge University Press was held at the AcharyaBhaban on August 14, 2017 (2:30 PM – 4:30 PM). The theme of the meeting was Magnetic Field Effects in Photochemistry. The speakers were Prof. SamitaBasu and Prof. DulalSenapati of the Chemical Sciences Division, Saha Institute of Nuclear Physics. The titles and abstracts of the talks are as follows.

Speakers:

Significance of magnetic field effects in photoinduced electron transfer reactions

Samita Basu

**Chemical Sciences Division
Saha Institute of Nuclear Physics**

In recent years we have been trying to study photophysical and photochemical aspects of inter- and intra-molecular electron/proton transfer and hydrogen abstraction reactions with small chemically and biologically important molecules and interactions of therapeutically important small molecules with proteins and DNA/RNA bases as well as with carbon nano-dots in homogeneous and heterogeneous confined media using steady-state and time-resolved spectroscopic techniques, magnetic field effects and theoretical modeling. Although steady-state and time-resolved absorption and fluorescence help to identify steady-state products and transient intermediates respectively, the importance of magnetic field effect lies in its ability to identify initial spin state of the photo-excited molecule, one of the deciding factors for ultimate products as well as to assess the intermediate distance between geminate spin-correlated radical ions / radicals produced as transients.

Speakers:

"Low Magnetic-Field-Induced Surface Enhanced Transient Spin-Trajectory Modulation (SE-TSTM): Interplay between Intramolecular and Intermolecular Spin-Rephasing"

Dr. Dulal Senapati

Saha Institute of Nuclear Physics, Kolkata-64

Abstract:The role of single-domain ferromagnetic nanostructure and the associated surface for many fold magnetic-field-induced surface enhanced transient spin-trajectory modulation (SE-TSTM) is a new venture in molecular spin dynamics. Though the inter conversion between spin isomers in the excited state is often forbidden by spin selection rule, hopping between two spin trajectory surface is quite probable due to their intramolecular [governed by spin-orbit (L-S) coupling] or intermolecular [governed by spin-mixing (Δg) or spin-spin (I-S) coupling] spin-rephasing-induced conical intersection. This lecture will explain the spin-trajectory modulation in great details

Third Program

July 18, 2017

"Ethnic Ancestry and Diversity in India"

Speakers:

Linguistic diversity in India

Prof. Shyamsundar Bhattacharya

**Philological Secretary, Asiatic Society, Kolkata
theasiaticsociety@gmail.com**

"Genetic ancestry and diversity in India"

Prof. Partha Pratim Majumder

**Distinguished Professor and Founder Director, National Institute of Biomedical Genomics, Kalyani
and Professor, Indian Statistical Institute, Kolkata**

Abstract:In India there are numerous spoken languages, considerable number of written languages (some with a long standing written traditions) including hundreds of dialectal forms, one margin into the next. Many of them have never been properly identified. Therefore, language identification is not a simple matter.

Of course, Grierson's Linguistic Survey of India (1896-1928) recorded 179 languages and 544 dialects in India, people of India Series of the Anthropological Survey of India (1993) have identified 325 languages. However, the only source of official data on languages is the Indian decennial Censuses. The last Censuses of 2001 reports 122 languages (of which 22 are included in the 8th Schedule of the Indian Constitution) and 234 identifiable mother tongues grouped under appropriate languages are a linguistic abstraction of 1635 mother tongues reported by the people indicating their perception of linguistic identities.

In addition to their mother tongues, 2001 Census also reports as many as 250 million Indians speak atleast two languages and more than 85 million speak three or more languages.

Participants

Prof. A.S.Kolaskar (VC, The Neotia University), Mrs.Rajya Lakshmi Manda (The Neotia University), Prof. Bikas K Chakrabarti (SINP), Sayantari Ghosh (Rammohan College), Bhaswar Ghosh (), Debayan Majumder (BI), Shreya Barui (BI), Prof. Krishna Bhattacharya (CU), Prof. Somdatta Sinha (IISER), Prof. Swati Sen Mandi (BI), Prof. Sujata Tarafder (JU), Prof. Parongoma Sen (CU), Prof. Anirban Kundu (CU), Kalyan K Mandi (Scottish Church College), Suruchi Lata (BI), Arijita Subuddhi (BI), Mr.Himansu Kr. Kundu (Geological Survey of India), Indrani Bose (BI), Prof. Manikuntala Kundu (BI), Prof. Joyoti Basu (BI), Prof. Achintya Sinha (BI), Satarupa Datta majumder (Asiatic Society), Prof. Parul Chakrabarti (JCBSHM, Sir J C Bose Trust)

Second Program

June 23, 2017

"Integrative Biology: Models and Experiments"

Speakers:

Reprogramming Living Cells With An Engineering Language

Sangram Bagh

Biophysics and Structural Genomics Division

Saha Institute of Nuclear Physics, Kolkata

Abstract: The molecular connectivity between genes and proteins inside a cell shows a good degree of resemblance with complex electrical circuits. This inspires the possibility of engineering a cell similar to an engineering device. Synthetic biology is an emerging field of bioengineering, where scientists use electrical and computer engineering principles to re-program cellular functions with a potential to solve next generation challenges in medicine, energy, and space travel. In this talk, we discuss our synthetic biology efforts to build a technology platform for cellular computation and robotics and systems biology effort to understand the effect of zero gravity on human and bacterial cells during space travel.

Modeling mitosis in mammalian and yeast cells

Dr. Raja Paul

Indian Association for the Cultivation of Science, Kolkata

Abstract: Accurate chromosome segregation during mitosis is critical to maintain genome stability and prevent erroneous cell division. To this aim, assembly of the mitotic spindle using a set of highly dynamic bio-polymers, known as microtubules (MT) must be coordinated with establishment of chromosomal attachment with the spindle via a specific structure on the chromosome called kinetochore (KT). The MTs of a correctly configured (bipolar) mitotic spindle must interact with the chromosomes (KTs) so that the two sister chromatids interact with opposite spindle poles. This configuration will allow the sister chromatids to be pulled to opposite ends of the cell upon chromosomal separation, thus leading to the formation of two daughter cells with the correct chromosome number. While mammalian cells divide via open mitosis (nuclear envelope breaks down), chromosome segregation in budding yeast cells occur within the nucleus known as closed mitosis. In closed mitosis, the entire nucleus migrates to a specific location within the cell before segregation. I will discuss the computer modeling of kinetochore microtubule interaction that correctly predicts experimentally-observed spindle assembly times with minimum error rates in both mammalian and yeast cells. I will further discuss the nuclear migration, spindle positioning in budding yeast. The model can be used to elaborate other features of the mitotic spindle including chromosomal oscillation and various spindle phenotypes.

Participants

Prof. Bikas Chakrabarty (SINP), Prof. Rahul Banerjee (SINP), Prof. Bhaswar Ghosh (IMSC), Prof. Indrani Bose (BI), Mrs. Sanjukta Ghosh (), Dr. Zhumur Ghosh (BI), Prof. Joyoti Basu (BI), Sayak Mukhopadhyay, Ph.D Student (SINP), Saptarshi Chatterjee, Ph.D Student (IACS), Apurba Sarkar, Ph.D Student (IACS), Subhendu Som, Ph.D Student (IACS), Kathakali Sarkar, Ph.D Student (SINP), Rajkamal Srivastava, Ph.D Student (SINP), Deepro Banerjee, Ph.D Student (SINP), Srijanee Das, MS Student (St. Xaviers College),

Prof. Atri Mukhopadhyay (SINP), Prof. Sakuntala Chatterjee (S N Bose Centre), Prof. Parul Chakrabarti (Ex – BI, Sir J C Bose Trust), Prof. ParthaPratimMajumder (ISI).

First Programme

May 18, 2017

"Classical and Quantum Computation and Information"

Speakers

- Prof. Sanghamitra Bandyopadhyay, Indian Statistical Institute, Kolkata
- Prof. D.P. Mukherjee, Indian Statistical Institute, Kolkata
- Prof. Guru Prasad Kar, Indian Statistical Institute, Kolkata
- Prof. Goutam Paul, Indian Statistical Institute, Kolkata

Participants

Sudeshna Banerjee (The Telegraph), Mandira Mitra (Integral CUP), Dr. A K Roy(IIT), Prof.G P Das(IACS), Prof. Indrani Bose (BI), Prof. Tapati Dutta (St. Xaviers College), Prof. Subinay Dasgupta (CU), Prof. Sujata Tarafdar (JU), Ms. Madhurima Sengupta (The Statesman), Prof. Banasri Basu (ISI), Mrs.Sanjukta Kundu, Prof. Samir Nath Mallik (SINP), Prof. Susmita Sarkar (CU), Prof. Parongama Sen (CU), Prof. Achintya Sinha(BI), Prof. Barun K Chatterjee (BI), Prof. Debasis Sarkar (CU), Prof. Parul Chakrabarti, Prof. Joyoti Basu (BI), Prof. Manikuntala Kundu (BI), Prof. Anirban Kundu (CU), Prof. Susmita Sarkar (CU)