

Dr. Shefalika Samaddar

Guest Faculty,
Department of Computer Science and Engineering,
NIT Sikkim
South Sikkim-737139

TITLE: MATHEMATICAL HISTORY OF INFORMATION SECURITY



Abstract: History of Information Security is as old as the first languages of human existence through sign, symbols and various sound, picture etc. The talk delivers the historical background, its importance in shaping the history of Human civilization and finally to the mathematical arena of information Security. The various events related to information security are narrated and demonstrated. The talk ends with the modern day applications of information security in day to day business as well as specialized application such as warfare, espionage, religious secret writing etc.

Dr. Sumitra Purkayastha

Professor,
Applied Statistics Unit,
Indian Statistical Institute,
Kolkata -700 108

TITLE 1: WHAT IS THE NUMBER OF DISTINCT REAL ROOTS OF A CUBIC EQUATION?



Abstract: We are familiar with the following fact about the number of real roots of a quadratic equation. The quadratic equation $x^2 + px + q = 0$ has no real root, or one real root with multiplicity two or two distinct real roots according as $p^2 - 4q < 0$ or $= 0$ or > 0 . How can we find the number of real roots of a cubic equation? This is what we wish to address in this talk. We shall show the following. The cubic equation $x^3 + px + q = 0$ has one real root - including the situation with only one having multiplicity three, or two distinct real roots, or three distinct real roots according as $\Delta := p^3/27 + q/2 = 4 > 0$ (or $p = q = 0$) or $\Delta = 0$ and $p < 0$ or $\Delta < 0$: We shall discuss adequate number of examples to illustrate the major issues.

TITLE 2: WHAT ARE THE INTEGER RIGHT TRIANGLES?

An integer right triangle is the same as a right triangle with integer sides. For instance, a triangle with sides (3, 4, 5) or with sides (5, 12, 13) is an integer right triangle. Can we characterize all such triples? This is what we wish to address in this talk. We shall show the following. The triple of positive integers (x; y; z), with x and y relatively prime, and y even, are the sides of a right triangle if and only if there exist relatively prime positive integers m and n of opposite parity with $m > n$ such that $x = m^2 - n^2$; $y = 2mn$; $z = m^2 + n^2$: We shall see some interesting consequences of this result.

Dr. Kalyan Chakraborty
Associate Professor G
Department of Mathematics
Harish-Chandra Research Institute
Chhatnag Road, Jhunsi, Allahabad-211019



TITLE: A SAUNTERING AROUND THE NUMBER
GARDEN

Abstract: I will begin with the definition of prime numbers and discuss its various interesting properties. Going through 'Fundamental Theorem of Arithmetic' I will raise the questions that are of immense interest. Discuss about some interesting kind of numbers and also various types of primes and the conjectures that are yet to be resolved.

Dr. Ujjwal Sen
Associate Professor G
Department of Physics
Harish-Chandra Institute
Chhatnag Road, Jhusi, Allahabad
Uttar Pradesh- 211019



Title: Quantum information technologies

Abstract: We will discuss about quantum information and computation, a relatively new field at the crossroads of physics, computer science, and information technology.

Dr. Suhrit Ghosh
Associate Professor and Head
Polymer Science Unit
Indian Association for the Cultivation of Science
Kolkata -70032



TITLE: A PLASTIC STORY: HISTORY REPEATS

Abstract: It is difficult to imagine our daily life today without synthetic and natural polymers. Polymers are used in the furniture, electronics, toys, communication, packaging, energy, health care, cosmetics, computers, aircraft and many more advanced applications. Tremendous advancement in science and technology over last several years has enabled us to replace iron or wood (gift from the Mother Nature) by man-made synthetic polymers. What are plastics and

polymers? Historically how they have evolved by encompassing different disciplines of basic and applied science? Where all are going? How to deal with emerging problem of “trash” without sacrificing comfort of life? In this talk, an historical perspective will be presented on the evolution of plastic technology and polymer science. Subsequently its adverse effects on environment and possible solutions will be addressed and in this context contribution of our group on value added biodegradable polymer synthesis will be discussed.

Dr. Siddhartha S. Jana

Associate Professor

Department of Biological Chemistry
Indian Association for the Cultivation of Science
Jadavpur, Kolkata-700032



**TITLE: DRIVE AND CURIOSITY FUEL THE PASSION
FOR SCIENCE**

Abstract: Do you still spend long hours in the lab? “Whenever I can, including weekends. Science is like a drug- I am an addict” said by a famous virologist, Harald Zaur Hussain, at German Cancer Research Centre in Heidelberg, Joint winner of 2008 Nobel Prize in Physiology or Medicine for discovery of the role of human papillomavirus (HPV) in causing cervical cancer. Another scientist, Ada Etil Yonath who lost her father at age 11 and helped her mother and younger sister at home. Yonath was the first Israeli woman to win a Nobel Prize and the first woman in 45 years to win the 2009 Nobel Prize in Chemistry for her work on the structure and function of the ribosome. There are many more stories which tell the scientific discoveries come from scientist’s passion and curiosity. I will discuss few questions related to human diseases like cancer, diabetes, alzheimer which are still unknown to scientists. These diseases are the burden of our society. Society is looking forward to the scientists of young generation to solve the problems related to health.

Dr. Pralay Majumder

Assistant Professor

Department of Life Sciences
Presidency University
Kolkata - 700073



Abstract: A journey that started in 1901 by William Ernest Castle, developed into science by Thomas Hunt Morgan by early 20th century, now the crown jewel of Geneticists; the fly, *Drosophila melanogaster*. Four nobels were awarded to fly geneticists and more will come. But Nobel is not the only reason we should know about this insect, we should know because we (that is ‘the fly’ and ‘human’) have more in common than we (the human) like to believe. So,

human being will learn more about them by studying flies. The journey of this fascinating organism started in equatorial Africa; now is the only organism that can travel world over without passport, visa, customs, and permits. Now you can find them all over the world, learn basic genetics with them, work at the advance genetics, cell biology, and immunology with them. The boundaries are endless and this captivating organism still entralls us with their complexity in the simplicity, 100 years later.

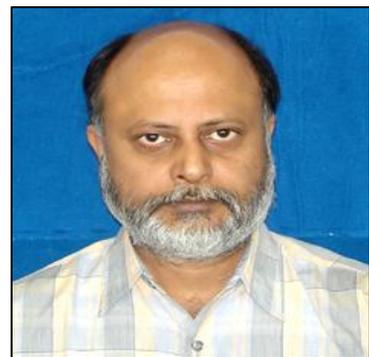
Dr. Sumit Saha
Assistant Professor,
Department of Chemistry,
NIT Sikkim
South Sikkim-737139

Title: The story about Fat



Prof. Susanta Lahiri
Senior Professor
Chemical Sciences Division
Saha Institute of Nuclear Physics
Bidhan nagar, Kolkata, West Bengal 700064

Title1: The Periodic table



Marie Curie s received second Nobel Prize (1911) in Chemistry for the discovery of new elements radium and polonium. In 1934, Marie and Pierre's daughter Irene and her husband Frederic Joliot discovered artificial radioactivity. Exploration of the upper part of the nuclear chart has always been a difficult task, particularly for transactinide elements, known as superheavy elements (SHE), never existed on the Earth and their synthesis to make handful of atoms or even just one - is a challenge! In the seminar I will discuss evolution of Periodic Table from Madam Curie to very recent attempts.

Title-II : Radium to radium - a hundred years cycle

Soon after the discovery of radium by Madam Curie, its life saving property was recognized followed by its life threatening property. Since then a large number of radioactive isotopes are used for diagnostic and curative purposes. The focus was shifted from radium to the short-lived reactor produced radionuclides, like ^{99m}Tc . Accelerator produced radionuclides like ^{18}F , ^{67}Ga , ^{201}Tl , ^{211}At , completed the reactor-produced radionuclides portfolio from late nineties. Light charged particle (p, d or α) induced reactions are mainly used for production of these clinically important radionuclides while heavy ion assisted reactions are also feasible in some cases. However, after the Fukushima incident various social and political constrains are

becoming more stringent for setting up new reactor facilities for isotope production. So, what is next? In the seminar I will discuss evolution of nuclear medicine in modest way.

Prof. Arun B. Samaddar

Director,
NIT Sikkim

South Sikkim-737139

**TITLE: SUSTAINABILITY, SCIENCE & TECHNOLOGY AND
ANCIENT INDIAN KNOWLEDGE BASE**



Prof. Amitava Datta
INSA Senior Scientist,
Department of Physics,
University of Calcutta,
Kolkata- 700 073



Title: The quest for elementary particles: From Atoms
to the Higgs boson

Abstract: The major milestones, theoretical as well as experimental, in the path to the discovery of the basic building blocks of nature will be described to the high school students. On our way we shall encounter, among other things, the last two Nobel Prizes in particle physics for the discovery of the Higgs Boson (2013) and some tantalizing properties of the neutrinos (2015).

Prof. Indranil Manna
Director, IIT Kanpur
Kanpur, India-208016

