



# Indian Institute of Technology Kanpur Department of Physics

## Professor Jagadishwar Mahanty Distinguished Lecture Series in Physics

The Ninth Lecture in the series will be delivered  
by

**Professor Amitava Raychaudhuri**

Physics Department  
University of Calcutta

on

### " The Enigma of Mass: Higgs and the see-saw "

Date: 3<sup>rd</sup> March, 2014 (Monday)

Venue: Outreach Auditorium

Time: 5:30 PM (Tea will be served at 5:00 PM in the Auditorium foyer)

#### ABSTRACT

The origin of mass of elementary particles has been a key which has opened several new directions in physics.

On the one hand is our understanding of the forces of Nature: There are many similarities between the electromagnetic and weak interactions. These encourage a unified picture. But a striking difference between the two is that, unlike electromagnetism, weak interactions are short-ranged. The mediator of electromagnetism is massless while that of the weak interactions is massive. This divide was bridged by the Higgs mechanism which was only recently vindicated through the detection of a tell-tale boson widely recognized as the 'God particle'.

On the other hand is an understanding of the mass scales: Till recently it was believed that neutrinos are massless. Painstaking experiments over many years have now convinced us that this is not the case, but the neutrino mass is very tiny. What is the reason behind the neutrino being so light compared to other quarks and leptons? Nowadays, it is widely believed that the smallness of the neutrino mass is tied to the heaviness of a partner neutrino - a mass see-saw. In this talk we take a stroll through these subjects. The idea is not so much to get into the technical details but to sample the novelty of the ideas and make an attempt to look beyond the horizon.

#### About the speaker



Prof. Amitava Raychaudhuri is a leading Indian theoretical Physicist. He is the Sir Tarak Nath Palit Professor of Physics at the University of Calcutta. He obtained his Ph.D from the University of Maryland. After postdoctoral works at Oxford and TIFR, he joined the University of Calcutta in 1980.

During his tenure at Calcutta University, Prof. Raychaudhuri has been a Scientific Associate at CERN, Senior Indo US Fulbright fellow at the Lawrence Berkeley Laboratory, and Senior Marie Curie fellow at the University of Cambridge. He has also been a visiting Professor at the Oklahoma State University and was the Director of Harish Chandra Research Institute from 2005 to 2011.

Prof. Raychaudhuri is the recipient of the INSA Young Scientist Award, the Shanti Swaroop Bhatnagar award, the J. C. Bose fellowship. He is a fellow of several academies of science, and was also conferred the International Alumnus of the year award by the University of Maryland.

Prof. Raychaudhuri has worked in diverse areas within particle physics encompassing Quantum Chromodynamics, Grand Unified Theories, classical solutions, left-right symmetric models, FCNC, supersymmetry, neutrino physics, extra dimensions etc. He made pioneering contributions in CP violation in supersymmetric models, the possibility of parity restoration at relatively low energies, neutrino masses and mixing in supersymmetric and other models, long baseline neutrino experiments, besides making a brief but important foray in the foundations of quantum mechanics. He holds a reputation of a charismatic teacher amongst his students.

#### Prof. Jagadishwar Mahanty Lecture Series in Physics



Prof. Jagadishwar Mahanty Lecture Series in Physics has been instituted by Dr. Siddharth Mahanty in memory of his father, Prof. Jagdishwar Mahanty, who was a faculty member of the Physics Department at IIT Kanpur from 1961-1972. He made important contributions to Condensed Matter Physics, particularly, to the study of many body physics,

lattice dynamics, van-der-Waals interactions and electronic structure of solids.

Prof. Mahanty was born on 20th July 1932 in Puri, Orissa. After his M. Sc. in Physics from Calcutta University, he worked for several years at the National Physical Laboratory. In 1956, he went to the University of Maryland, USA for his doctoral degree. After completing his Ph.D. in 1960 he joined Panjab University, Chandigarh and subsequently joined the Physics department of IIT Kanpur in 1961. He was instrumental in shaping the Physics department during its infancy. He was the Head of the Physics department from 1967 to 1972. In 1971, Prof. Mahanty decided to concentrate on his own research and gave up the administrative responsibility. In 1972, he joined the prestigious Australian National University and superannuated from there in July 1995 due to ill health.

Prof. Mahanty was an excellent physicist with a very modest and kind personality. His helpful nature to both students and colleagues was a great asset of his character. He was a warm and caring person who is greatly missed by his family and friends.