18 - 22 December 2017 **IIT Guwahati**

Electroweak Symmetry Breaking, Flavour Physics and BSM

Overview

It is well established that the dynamics of elementary particles is guided by the principle of gauge symmetry. It is also known that presence of mass terms of the elementary particles necessarily break the gauge symmetry. In the Standard Model (SM) of particle physics, the Electroweak Symmetry Breaking (EWSB) provides a way to generate gauge boson masses through the celebrated Higgs mechanism; the concept, which was honoured with Nobel Prize in Physics in 2012. However, the idea itself, and the technical details of the mechanism are far from understood. First of all, introducing the mechanism in an aesthetically appealing way require generating it in a dynamic way. Radiative EWSB mechanism is an attempt in this direction. Secondly, the standard Higgs mechanism with one electroweak doublet scalar field is troubled with certain technical issues like the stability of mass of Higgs boson against quantum corrections and stability of the vacuum, etc. Dynamics of flavor physics is intimately connected with the EWSB mechanism, and therefore provides valuable insight into the mechanism itself, and often provides decisive experimental inputs in establishing or disproving theoretical propositions. In addition, flavor physics in itself demands close attention to understand the origin of flavour, and other details, in both the lepton as well as the quark sector. With important questions on baryon asymmetry of the universe and issues with the neutrino sector of study of Flavour Physics is one of the main focuses of today's particle physics.

A through understanding of the EWSB mechanism including the technical details is essential for all graduate students and young researchers pursuing their research in particle physics, irrespective of their focused field of expertise. The details should include the rapid developments that have happened in the recent years, in view of the LHC experiments, and a wide variety of neutrino physics experiments, as well as dedicated B-meson experiments like Belle.

Modules	**A: EWSB within and beyond the Standard Model** **B: Flavour Physics and BSM** **C: Future Directions in EWSB and Flavour Physics**
You Should Attend If…	▪ You are a researcher working in the area of particle physics theory/experiment ▪ You are a PhD student (any level) working in particle physics ▪ You are an MSc student (final year) with introductory level understanding of particle physics.
Registration **Last date: 31 October 2017**	Number of participants for the course will be limited to fifty. **Student Participant: INR 1000** **Postdoctoral Fellows: INR 2500** **Faculty members: INR 5000** The participants will be provided with accommodation on nominal charges.
Topics Covered	Spontaneous Symmetry Breaking and Higgs Mechanism, Flavour Structure of the SM, Grand Unification and Flavor Puzzle, Froggatt-Nielson Mechanism, Radiative Fermion Mass Generation, Strong CP problem and its Resolutions.

The Faculty

Prof. Kaladi S. Babu, Regents Professor and Interim Head of the Department of Physics at the Oklahoma State University, USA, is an internationally acclaimed figure in particle physics engaged in theoretical studies of BSM scenarios. Prof. Babu is one of the global experts on Flavour Physics, with important contributions to the understanding of neutrino physics. The well known Zee-Babu mechanism to generate the tiny neutrino mass radiatively is celebrated as a fine and viable alternative to the conventional seesaw mechanism. Apart from his interest in neutrino physics, he has made valuable contributions to the study of grand unified models, baryogengesis, and other BSM scenarios, including some of the multi-Higgs models. He has more than 200 publications in peer reviewed international journals with more than 12500 citations. Prof. Babu is a Fellow of American Physical Society and recently named as 2017 Distinguished Scholar by Fermilab.

Prof. Poulose Poulose, Professor in the Department of Physics at IIT Guwahati is an experienced particle physics phenomenologist. His major interests lie in the collider studies of BSM scenarios including multi-Higgs models, top-quark dynamics, search for signatures of low-energy gravity models, and more recently studies of dark matter models.

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