IIT KANPUR

DEPARTMENT OF PHYSICS

PHYSICS COLLOQUIUM

THE QUEST FOR PHYSICS BEYOND THE STANDARD MODEL

Abstract

The Standard Model of particle physics is one of the most successful theories in modern physics, extensively validated through decades of experiments. However, it remains incomplete. It does not account for neutrino masses, dark matter, matter-antimatter asymmetry, and the origin of electroweak symmetry breaking, indicating the need for physics beyond the Standard Model (BSM). In this colloquium, we will look for signals of BSM physics through two key probes: dark matter and Higgs properties.

After briefly introducing dark matter physics, we will elucidate how dark matter's observed properties constrain models of early universe cosmology, potentially revealing signatures of modified expansion histories before the Big Bang Nucleosynthesis. We will demonstrate that dense astrophysical objects such as neutron stars provide sensitive probes for dark matter interactions. Finally, we will examine what precision measurements of the Higgs boson properties tell us about models of electroweak symmetry breaking and new physics scales. Combined with theoretical and experimental constraints, this helps map the landscape of BSM physics and guide our search for it.

Speaker

Prof. Debtosh Chowdhury
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All are cordially invited

Monday, 15th Sept., 2025

5:15 PM(Refreshments at 5:00 PM)

FB 382 (Amal Kumar Raychaudhuri Seminar Room)