



**S N BOSE NATIONAL CENTRE  
FOR BASIC SCIENCES**

*Block JD, Sector III, Salt Lake, Kolkata 700 106*

## **DEPARTMENTAL SEMINAR**

# **Department of Astrophysics and High Energy Physics**

**03<sup>rd</sup> Feb.2025**

**4.00 PM**

**FERMION / ONLINE**

### **SPEAKER**

**Prof. Srubabati Goswami**



**Short Bio :** Prof. Srubabati Goswami is an Indian scientist specializing in High Energy Physics, Astroparticle Physics, and Neutrino Physics . She is the first Indian woman to earn a Ph.D. in neutrino oscillations from the Science College, University of Calcutta. She did her research in the PRL and Saha Institute of Nuclear Physics and later worked in the Harish Chandra Research Institute. She is a Senior Professor in Theoretical High Energy Physics in the Physical Research Laboratory. She is a fellow of Indian Academy of Sciences, National Academy of Sciences, India and Indian National Science Academy.

### **TITLE OF THE TALK**

**The Fable of the Unstable Neutrinos**

### **ABSTRACT**

Neutrino decay is governed by a non-Hermitian effective Hamiltonian and in general the mass eigenstates and decay eigenstates are not the same. This mismatch is inevitable in the presence of matter and the Hermitian and anti-Hermitian components cannot be simultaneously diagonalized by unitary transformations for all matter densities. In this talk a formalism for treating the two-flavor neutrino propagation through matter of uniform density, for neutrino decay to invisible states, will be discussed. First, it will be shown how employing the inverse Baker-Campbell-Hausdorff or Zassenhaus expansion, compact analytic expressions for neutrino survival and conversion probabilities can be obtained. We will also discuss the approximate analytic probabilities in the three generation framework and show the baselines and energies where the different approximations give good matching with the numerical probabilities. These results provide physical insights into the effects of neutrino decay at long-baseline neutrino oscillation experiments.

### **HOST FACULTY**

**Prof. Amitabha Lahiri**

**Dept. of ASTROPHYSICS AND HIGH ENERGY PHYSICS**

\*\*\*\*\*