Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Realtime-3D Super-Resolution Microscopy for Fast Cellular Dynamics

Abhishek Sau

TAMU, TX

How does a cell manage the constant flow of cargo moving in and out of its nucleus without traffic jam? Every second, thousands of molecules race through nuclear pores, tiny 50-60 nm “high-security gates” of the nucleus. This system keeps cells alive but is easily disrupted by stress, neurodegeneration, and viruses like HIV-1, Dengue, Zika, and SARS-CoV-2. In this talk, I will introduce new 3D super-resolution and single-particle tracking tools- PALM, STORM, and next-generation 3D MINFLUX to visualise rapid cellular dynamics. We will take a tour into the nanoscale 3D-world of nucleocytoplasmic transport, where we catch a glimpse of individual cargoes zipping through single, transport-active nuclear pore in real time. By revealing this hidden traffic, we uncover how cells function and what happens when their gates fail.

Tuesday, Dec 23rd 2025

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Auditorium, TIFRH