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

Seminar

The Role of Liquid-Liquid Phase Separation in Regulating DNA Damage Repair and Signalling-Dependent Gene Transcription

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Cellular processes rely on the spatial concentration of protein complexes to execute biochemical reactions with precision. While traditionally coordinated by membrane-bound organelles, emerging evidence highlights the role of membrane-less condensates formed via liquid-liquid phase separation (LLPS) in organising such reactions within the cells. My talk focuses on two key examples where LLPS modulates chromatin-associated functions: DNA damage repair and steroid hormone signalling-responsive transcription. I demonstrate that HP1α and HP1β exhibit isoform-specific dynamics at heterochromatic double-strand breaks, influencing repair pathway selection and genomic stability. Additionally, I show that ERα-driven condensates coordinate transcription within a single Topologically Associating Domain (TAD), regulating expression of TFF1 and TFF3 genes during acute estrogen signalling. These findings reveal transcription or repair mediated condensates as a critical mechanism for tuning genome function and stability.

Friday, Aug 29th 2025

11:30 Hrs (Tea / Coffee 11:15 Hrs)

Seminar Hall, TIFRH