

## **Seminar**

### **Stress induced spatial and temporal reorganization of the nucleolus and its role in DNA damage responses**

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The nucleolus is a phase-separated biomolecular condensate and a critical sensor of cellular stress, yet how its repetitive rDNA is protected and reorganized during damage remains poorly understood. Using Expansion Microscopy and single-molecule FISH, we show that stress-induced nucleolar remodelling scales with nascent rRNA levels. We demonstrate that stress induced perturbation of rRNA synthesis alters internal pH gradients and molecular interactions, along with the material properties and dynamics of resident proteins like UBF1. Furthermore, targeted laser-induced rDNA damage reveals that repair factors are recruited inside the nucleolus as an early response before classic nucleolar caps form. This damage also triggers a rapid, actin-dependent nucleolar expansion, driving the differential localization of PARP1 and Nucleolin. Together, these higher resolution spatial and temporal insights redefine our understanding how the nucleolus physically adapts to preserve genomic integrity under stress.

***Wednesday, Jun 24<sup>th</sup> 2026***

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

***Auditorium, TIFRH***