Bar Ilan University , Colloquium

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Disecting transcription regulation using single molecule imaging

Abstract:

While membranes do not compartmentalise the nucleus, it shows a complex organisation at many scales. Spatial organisation of chromatin and transcription factors can modulate nuclear functions and in order to study this relation, we have developed methods to localise proteins and mRNAs at the single molecule level and with spatial resolutions in the range of a few nanometers (modifications and improvements of PALM, sptPALM and STORM using adaptive optics). Moreover, proteins move throughout the nucleus by diffusion, transiently and repetitively contacting their target sites. While DNA has been reported as a guide facilitating target search in the cell by restricting 3 dimensional explorations to a 1 dimensional search, such exploration modes were not envisioned mediated by protein-protein interactions. I will discuss chromatin and RNA polymerase II organisation in the nucleus as well as mechanisms guiding proteins to their targets in the nucleoplasm.