McGill

Department of Anatomy and Cell Biology

Seminar Series

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Hosted by: Natalie Zeytuni, Ph.D.

Wednesday, October 12, 2022
11:30 am -12:30 pm
Room 1/12 - Strathcona Anatomy and Dentistry Building

"Tracking DNA-binding proteins, one at a time, to understand cells and their genome"

Cellular function results from a myriad of chance encounters between proteins and other molecules. Precise regulation of cellular activities emerges from the spatial and physicochemical boundaries set by the cell, but how this happens is still an active topic of research. In simple words, we are interested in understanding how 'dumb' proteins in the cell know when and where they need to be. Single-molecule fluorescence microscopy techniques, where individual copies of a particular protein can be tracked, offer unique insight on protein activity and the intracellular environment. In my lecture, I will describe how my group applies single-molecule microscopy to the study of live cells. I will talk about two ongoing projects in our lab: the study of the activity of the bacterial replisome – the machinery in charge of replicating the genome –; and the regulation of cell size homeostasis in budding yeast. In the first case, I will describe how subunit turnover in the bacterial replisome occurs and speculate on how turnover provides a functional advantage for genome integrity. In the second, I will describe how a dynamic interaction between transcription factors and chromatin senses cell size and controls the start of the cell cycle. In both cases, I will highlight the importance of protein dynamics, how they are modulated, and how are they exploited to generate order in the cell.