BiophysTO Lunchtime Seminar Series

Date
Tuesday, Feb 22, 2024
12:00 pm – 1:00 pm

Location
McLennan Physical Labs
60 St. George Street
Room MP606

Pizza and refreshments will be provided

Dr. Ahilya Sawh

Department of Biochemistry
University of Toronto

Chromosome acrobatics during embryonic development

How one genome generates a large diversity of cell types, each with unique spatiotemporal gene expression patterns and physiological roles, is a fundamental question in cell and developmental biology. Recent work has indicated that nuclear organization plays important roles in controlling genome functions (transcription, replication, recombination, repair), and defects in genome organization are implicated in aberrant developmental and diseased states. However, the mechanisms of action are not well understood, nor is it clear what chromosome conformations are prevalent, or how they are formed *in vivo*. To study the forms and functions of genome organization at the single-cell level, I merged novel super-resolution imaging and computational approaches in C. elegans embryos. I developed high-throughput, multiplexed DNA FISH to trace the contours of entire chromosomes ('chromosome tracing') in intact tissues, and probe conformational dynamics during early development. Chromosome tracing enables the simultaneous localization of hundreds of fluorescently-labeled targets to directly map chromosome architecture and extract dense 'spatial omics' information even from rare samples. I have previously uncovered high chromosome-scale polymer folding pattern variability, and a novel topological role for the nuclear lamina in systemically stretching chromosomes, increasing structural heterogeneity, and weakening compartments. In the future, my new research group will investigate the genetic and molecular determinants of large-scale conformations, and the causal relationships between chromosome conformation and genome function.

Host: Dr. Walid A. Houry

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