

*Title:*

Super-resolution microscopy and cell division

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*Abstract:*

Cell division can be viewed as a physical process: DNA is duplicated and condensed into visible chromosomes; duplicated chromosomes are first pushed to the midplate of the cell and then separated and pulled to opposite poles of the cell; and finally the cell physically divides into two via active constriction (cytokinesis). My students and I have been working to understand how biological structures on the scale of nanometers perform these physical tasks. In particular, we use super-resolution microscopy to examine molecular structures and processes: microtubule shrinking (associated with chromosome separation) and actomyosin ring constriction (associated with cytokinesis). So, in this talk, I will bring the perspective of a physicist to a biological process, using the example of super-resolution microscopy to describe how physical tools can open new observational windows, and the example of microtubule dynamics to describe how physical models can help us understand the mechanisms of living systems.