BLERTA SHTYLLA, Pomona College

Mathematical models of force generation at the cellular nanoscale: interplay of protein flexibility and diffusion.

At the cellular micron-scale, force generation and transport requires the rectification of diffusive motion. Such a task is no small feat particularly as several mechanical events in our cells need to be highly precise in their action. In response to these needs, cells have evolved exotic nano-machines that can harness diffusion to complete their tasks. In this talk, I will discuss mathematical models of the mechanisms driving cell division nano-machines, called kinetochores. These highly specialized structures assemble on chromosomes during mitosis and mediate the equal partitioning of our genetic material. Using modeling, we will show that diffusion and specialized binding architectures can be used to generate directed kinetochore movement. Internal protein compliance can have a surprising role, which we show can be rather similar to the muscle contraction paradigm.