



The University of Chicago
Departments of Computer Science,
Mathematics, and Statistics

Scientific and Statistical Computing Seminar

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Motor-Cargo Dynamics in Microtubule-based Intracellular Transport

THURSDAY, November 10, 2011, at 3:30 PM

207 Eckhart Hall, 5734 S. University Avenue.

ABSTRACT

In this talk, we will consider a stochastic differential equation framework for analyzing the interaction between processive molecular motors, such as kinesin and dynein, and the biomolecular cargo they tow as part of microtubule-based intracellular transport. We show that the classical experimental environment is in a parameter regime that is qualitatively distinct from conditions one expects to find in living cells. However, an asymptotic analysis of the proposed system of SDEs permits one to take “in vitro” observations of the nonlinear response by motors to forces induced on the attached cargo, and make analytical predictions for two regimes that frustrate direct experimental observation: 1) highly viscous “in vivo” transport and 2) dynamics when multiple identical motors are attached to the cargo and microtubule.

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