Effective statistics of molecular motor ensembles

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Effective statistics of molecular motor ensembles

Abstract
To facilitate the transport of molecular cargo across a cell, eukaryotes use molecular motor ensembles which travel along microtubule networks. Molecular motors are an example of directed transport, using ATP to create a stepping motion whose direction depends on microtubule orientation and motor type. For this talk, we develop a model of procession for attached and unattached motors, as well as molecular cargo, through a nonlinear system of stochastic differential equations. By exploiting multiscale behavior for this system, we are able to approximate motion by a Markov chain model, and derive effective statistics for long time behavior of motors. We mention several subtleties related to measuring velocities and diffusivities, and also compare qualitative behavior between simulations of our model and experimental observations.