

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

An active matter analysis of intracellular Active Transport BO WANG, KEJIA CHEN, SUNG CHUL BAE, STEVE GRANICK, University of Illinois Urbana-Champaign — Tens of thousands of fluorescence-based trajectories at nm resolution have been analyzed, regarding active transport along microtubules in living cells. The following picture emerges. Directed motion to pre-determined locations is certainly an attractive idea, but cannot be pre-programmed as to do so would sacrifice adaptability. The polarity of microtubules is inadequate to identify these directions in cells, and no other mechanism is currently known. We conclude that molecular motors carry cargo through disordered intracellular microtubule networks in a statistical way, with loud cellular “noise” both in directionality and speed. Programmed random walks describe how local 1D active transport traverses crowded cellular space efficiently, rapidly, minimizing the energy waste that would result from redundant activity. The mechanism of statistical regulation is not yet understood, however.

Bo Wang
University of Illinois Urbana-Champaign

Date submitted: 08 Nov 2011

Electronic form version 1.4