Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Anomalously slow transport of large particles inside microtubules due to slow binding ANDREW RUTENBERG, SPENCER FARRELL, Dalhousie University — Bulk and single-particle mobilities are equal in single-file diffusion without bound immobile particles, or when the binding kinetics are sufficiently fast. However, using stochastic simulations we have found that for slow binding kinetics there is strong anomalous slowing that depends on both binding and unbinding rates. This effect, which requires finite particle density, is distinct from the well understood density-dependent tracer-particle diffusion seen in single-file diffusion without binding. We find strong slowing in the parameter regime expected for luminal diffusion of the acetylation enzyme αTAT1 within microtubules. We also present a scaling argument for the reduced transport at moderate to high densities that captures the observed slowing.

Andrew Rutenberg
Dalhousie University

Date submitted: 11 Nov 2016 Electronic form version 1.4