Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Viscoelastic properties of actin networks influence material transport[1] SAMANTHA STAM, Biophysical Sciences Graduate Program, University of Chicago, KIMBERLY WEIRICH, James Franck Institute, University of Chicago, MARGARET GARDEL, Department of Physics and James Franck Institute, University of Chicago — Directed flows of cytoplasmic material are important in a variety of biological processes including assembly of a mitotic spindle, retraction of the cell rear during migration, and asymmetric cell division. Networks of cytoskeletal polymers and molecular motors are known to be involved in these events, but how the network mechanical properties are tuned to perform such functions is not understood. Here, we construct networks of either semiflexible actin filaments or rigid bundles with varying connectivity. We find that solutions of rigid rods, where unimpeded sliding of filaments may enhance transport in comparison to unmoving tracks, are the fastest at transporting network components. Entangled solutions of semiflexible actin filaments also transport material, but the entanglements provide resistance. Increasing the elasticity of the actin networks with crosslinking proteins slows network deformation further. However, the length scale of correlated transport in these networks is increased. Our results reveal how the rigidity and connectivity of biopolymers allows material transport to occur over time and length scales required for physiological processes.

[1]This work was supported by the U. Chicago MRSEC

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Date submitted: 13 Nov 2014 Electronic form version 1.4