Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Active Alignment of Driven Copolymer Systems LEILA FARHADI, DANIEL TODD, VIKRANT YADAV, JENNIFER ROSS, University of massachusetts, Amherst — Active matter spans length scales from macroscopic bird flocks to the sub-cellular microscale. The cytoskeleton is a model active network of filaments that exist in all cells, playing roles in many cell functions such as cell division, intracellular transport, and shaping the cell. Microtubules and actin are two cytoskeletal filaments that work together in cells to give shape and motility when combined with their accessory proteins and enzymes. Microtubules can be driven in filament gliding assays via kinesin-1 motor proteins. Actin filaments can be driven via myosin-II. Hydrolysis of ATP is the energy source for the movement of these motor driven filaments in the cell to perform their function. Prior work has studied each of these filaments and their associate motors individually, we are interested to study both of them together in an in vitro motility assay. This is interesting because their stiffnesses vary by several orders of magnitude, with actin being floppier ($L_p \sim 16\mu m$) and microtubules being stiffer ($L_p \sim 1mm$). We explore different patterns formed by actin and microtubule filaments above certain concentration where non-equilibrium disordered to ordered transition of filament takes place.

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Date submitted: 10 Nov 2016 Electronic form version 1.4