Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Visualization of the material response in an actomyosin network at the onset of internal motor activity SAMANTHA STAM, Biophysical Sciences Graduate Program, University of Chicago, MARGARET GARDEL, Department of Physics, University of Chicago — The actomyosin cortex of living cells generates forces that drive structural rearrangements at the sub-cellular, cellular, and tissue length scales during cell migration, cell division, and tissue formation. In the cortex, filaments of myosin II motors actively generate stresses on actin filament networks and bundles to form an active contractile material. However, how the spatial and temporal regulation of contractile deformation is affected both by local stresses and the material response is not understood. For instance, the extent to which the stress-strain relationship within active networks may be understood with governing equations from continuum elasticity is unknown. Here, we directly measure strain fields within quasi-2D actin networks subjected to varying degrees of internal myosin activity. We observe evidence that both the motor-generated stress and its propagation are regulated by network properties such as cross-linking. Stresses propagate anisotropically and produce a non-trivial material response even at motor concentrations much lower than those required to observe robust contractile behavior. Our data yield insights into how cellular networks make use of varying microstructures to regulate motor-generated force and the resulting strain.

Samantha Stam
Biophysical Sciences Graduate Program, University of Chicago

Date submitted: 14 Nov 2013 Electronic form version 1.4