Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Dissecting Subcellular Actomyosin Mechanics with Magnetically Actuated Micropost Arrays YU SHI, Johns Hopkins University, STEVEN HENRY, JOHN CROCKER, University of Pennsylvania, DANIEL REICH, Johns Hopkins University — The cellular actomyosin cytoskeleton is widely regarded as an archetypal example of an active matter system. However, the extent to which the wide range of observed cellular motility behaviors arise from active-matter physics is not well understood. Characterizing an active matter system requires simultaneous measurement of the fluctuation spectrum of the internal force generators and also the local viscoelasticity to separate the distinct effects of the material's internal stresses from its viscoelastic response to those stresses. By placing cells on top of PDMS micropost arrays with magnetic nanowires embedded in selected posts, we can actuate local regions of the cells by applying AC magnetic fields to dynamically probe the local viscoelasticity, while simultaneously using the posts as "probe particles" for passive microrheology measurements of the cytoskeletal force fluctuations. The range of active and passive responses observed for different subcellular regions of fibroblast cells will be presented, and the results compared to simple active material models based on known or predicted behavior of molecular motors in viscoelastic networks. Effects of coupling between local cellular regions as measured by correlations in the microposts' motion will also be described.

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Date submitted: 12 Nov 2014 Electronic form version 1.4