Abstract Submitted
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Characterizing active cytoskeletal dynamics with magnetic microposts[1] YU SHI, Department of Physics and Astronomy, Johns Hopkins University, STEVEN HENRY, JOHN CROCKER, Department of Chemical and Biomolecular Engineering, Univ. of Pennsylvania, DANIEL REICH, Department of Physics and Astronomy, Johns Hopkins University — Characterization of an active matter system such as the cellular cytoskeleton requires knowledge of three frequency dependent quantities: the dynamic shear modulus, $G^*(\omega)$ describing its viscoelasticity, the Fourier power spectrum of forces in the material due to internal force generators $f(\omega)$, and the spectrum of the material's active strain fluctuations $\mathrm{x}(\omega)$. Via use of PDMS micropost arrays with magnetic nanowires embedded in selected posts, we measure the local complex modulus of cells through mechanical actuation of the magnetic microposts. The micrometer scale microposts are also used as passive probes to measure simultaneously the frequency dependent strain fluctuations. We present data on 3T3 fibroblasts, where we find power law behavior for both the frequency dependence of cells' modulus $|G(\omega)|\tilde{}\omega^{0.27}$ and the power spectrum of strain fluctuations $|\mathrm{x}(\omega)|\sim \omega^{-2}$. Results for the power spectrum of active cytoskeletal stresses determined from these two measurements, and implications of this mesoscale characterization of cytoskeletal dynamics for cellular biophysics will also be discussed.

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