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Elasticity of a cross-linked active bundle[1] SILKE HENKES, Syracuse University, TANNIEMOLA B. LIVERPOOL, University of Bristol, M. CRISTINA MARCHETTI, A. ALAN MIDDLETON, JENNIFER M. SCHWARZ, Syracuse University — Understanding the effect of motor proteins, such as myosins, on the elasticity of crosslinked actin networks is essential to our understanding of cell mechanics. Both in vivo and in vitro, these active networks have radically different mechanical properties from their equilibrium counterparts, including contractile behavior and higher elastic moduli. Existing theoretical models do not address the relative role of passive and active crosslinkers in controlling the network contractility and stiffening. We construct a one dimensional lattice model with minimal ingredients, that is, rigid polar filaments, spring-like passive crosslinks and active crosslinks with on/ off dynamics implemented through non-equilibrium Monte Carlo solution of the corresponding master equations. We find, consistent with experiments, that the network needs to be percolated through the passive crosslinks to be mechanically stable. Contractile behavior is observed for all concentrations of active crosslinks. We study the mechanical properties of the gel in the phase space of motor processivity, crosslink stiffness, and concentration of active crosslinks.

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