Abstract Submitted
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The Fysics of Filopodia (or The Physics of Philopodia) JEN SCHWARZ, Syracuse University, AJAY GOPINATHAN, UCSB, KUN-CHUN LEE, University of Pennsylvania, ANDREA LIU, University of Pennsylvania, LOUISE YANG, Cambridge University — Cell motility is driven by the dynamic reorganization of the cellular cytoskeleton which is composed of actin. Monomeric actin assembles into filaments that grow, shrink, branch and bundle. Branching generates new filaments that form a mesh-like structure that protrudes outward allowing the cell to move somewhere. But how does it know where to move? It has been proposed that filopodia serve as scouts for the cell. Filopodia are bundles of actin filaments that extend out ahead of the rest of the cell to probe its upcoming environment. Recent in vitro experiments [Vignjevic *et al.*, J. Ce ll Bio. **160**, 951 (2003)] determine the minimal ingredients required for such a process. We model these experiments analytically and via Monte Carlo simulations to estimate the typical bundle size and length. We also estimate the size of the mesh-like structure from which the filopodia emerge and explain the observed nonmonotonicity of this size as a function of capping protein concentration, which inhibits filament growth.

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