Self-Organized Cell Motility from Motor-Filament Interactions
XINXIN DU, KONSTANTIN DOUBROVINSKI, MIRIAM OSTERFIELD, Princeton University — Cell motility is driven primarily by the dynamics of the cell cytoskeleton, a system of filamentous proteins and molecular motors. It has been proposed that cell motility is a self-organized process; that is, local short-range interactions determine much of the necessary dynamics required for the whole-cell organization that leads to polarization and directional motion. Here we present a mesoscopic meanfield description of filaments, motors, and cell boundaries; this description gives rise to a dynamical system exhibiting multiple self-organized states. We discuss several qualitative aspects of the asymptotic states and compare them to those of living cells.