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Quantitative Analysis of Statics and Dynamics of Actin Cables in Fission Yeast EDDY YUSUF, Lehigh University, JIAN-QIU WU, The Ohio State University, DIMITRIOS VAVYLONIS, Lehigh University — The assembly of actin and tubulin proteins into long filaments and bundles, i.e. closely-packed filaments, underlies important cellular processes such as cell motility, intracellular transport, and cell division. Recent theoretical and experimental work has addressed the nonequilibrium dynamics of single microtubules within live cells [1]. Actin filaments usually form dense networks that prevents microscopic imaging of individual filaments or bundles. Here, we studied actin dynamics using fission yeast that has low-density actin cytoskeleton consisting of actin cables (actin bundles aligned along the long axis of the cell) and “actin patches.” Yeast cells expressing GFP-CHD were imaged by 3D confocal microscopy. Stretching open active contours [2] were used to segment and track individual actin cables. We analyzed their curvature distribution, the tangent correlation, and the temporal bending amplitude fluctuations. We contrast our findings to equilibrium fluctuating semiflexible polymers and to microtubules in cells. We calculate the important time and length scales for the actin cables. We also discuss our findings within the broad context of understanding actin assembly in cells. [1] C. P. Brangwynne et. al., Phys. Rev. Lett. 100, 118104 (2008) [2] H. Li et. al., Proc. of the IEEE Int'l Symposium on Biomedical Imaging: From Nano to Macro, ISBI'09

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