DEPARTMENT OF BIOLOGY | UNIVERSITY of WASHINGTON

Biology Seminar

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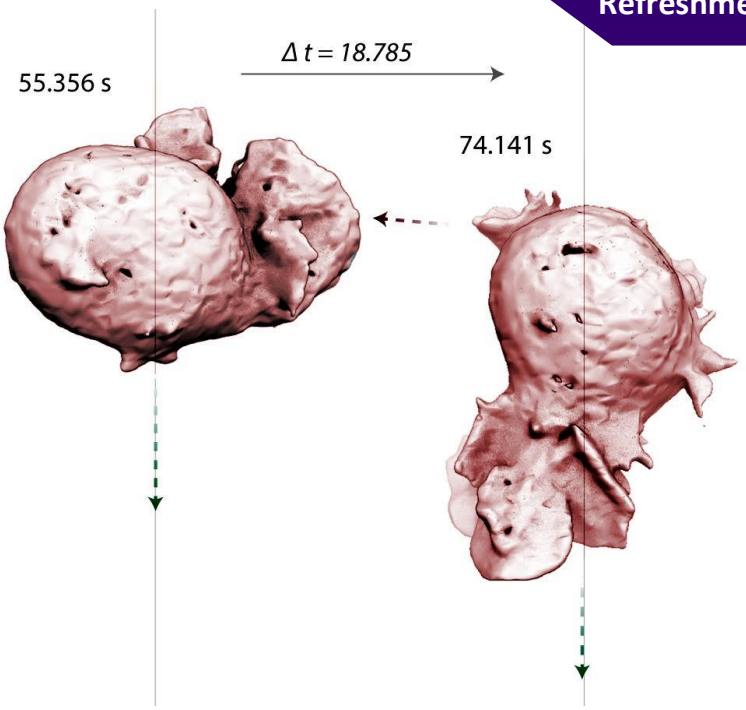
Heraclitus and the cytoskeleton: the role of force feedback in molecular self-assembly

Monday, Nov 28, 2016 | 12:00pm HCK 132
Refreshments at 11:45am



The mechanical properties of most eukaryotic cells is determined by the actin cytoskeleton. A major challenge to understanding the physical properties of actin networks, however, is that they are dynamic: their assembly and disassembly are integral to their function. External forces are particularly relevant to 'dendritic' actin networks, generated by the nucleating and crosslinking activity of the Arp2/3 complex, a seven-subunit protein complex that builds crosslinked filament arrays by creating new filaments that branch from the sides of existing filaments. Dendritic actin networks assemble in contact with membranes and exert pushing forces required for many cellular processes, including: amoeboid locomotion, endocytosis, phagocytosis, and autophagy. To construct force-generating actin networks, the Arp2/3 complex works with a set of highly conserved collaborators: actin, WASP, capping protein, cofilin, and profilin. Using a combination of biochemical and biophysical methods we find that these force-generating networks respond to external forces by becoming denser and stiffer and by dynamically altering their three-dimensional architecture to prevent mechanical collapse.

Hosted by: Alexander Paredez, Assistant Professor