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PHYS 493 Dr. Lau
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Colloquium Date: 14 March 2018
Colloquium Speaker: Dr. Tai-De Li
Colloquium Title: Nanotechnology Application on Biology: Mechanobiochemistry of Branched Actin Network and Chloroplast by AFM
Speaker Affiliation: City University of New York, New York

Dr. Li's research focuses on using atomic force microscopy to explore the protein dynamics that are responsible for the movement of cells. Actin is the most dynamically active protein in the cell, and its growth is associated with the movement of cells to chase and destroy bacteria. As the cell receives external signals, some biochemical reactions cause actin networks to develop and apply a force to the cell membrane to move the cell in the direction of the bacteria or oppose the applied external force. However, there is a 'capping' mechanism in which there is a limit to the length of the actin chains. Since the capping molecule is about the same size as the actin, the Brownian motion of the chain allows for either actin or the capping molecule to bind.

This is a very interesting problem, and although I did not ask a question in the colloquium, I have been thinking a lot about the problem of the actin networks in the cell. Dr. Li didn't discuss the effect of the concentrations of the actin or the capping molecules. It would be interesting to see the distribution of the concentrations of each molecule. I would imagine in a real cell, the distribution of the actin and the capping molecule is heavily non-uniform. To move the cell and preserve actin, the capping molecules would typically want to gather near enough to the actin network to stop the growth of the chains that are no longer applying force to the cell wall. Additionally, the capping molecules would only get in the way of the actin binding if they were too close to the binding sites, and the cell would move less effectively. It would also be very interesting to see the relative binding information for the cap molecule and the actin on the actin chain.

Overall, I enjoyed this talk. The problem is very interesting, and I think there still is a lot of work to be done for the investigation of this process. I hope that Dr. Li is allowed to continue his research and continues to produce results.