PHYSICAL MATHEMATICS SEMINAR

Mechanics of active cellular system

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ABSTRACT:

Cells are active systems that can regulate their mechanical properties according to different environments and functions: bone cells are much stiffer than neurons; this reflects the stiffness of the surrounding tissue they are growing in. The mechanical property of cells and their ability to regulate it are critical for numerous fundamental cellular functions at single cell level and are also thought to play essential role in embryo development. In this talk, I will discuss new measurement techniques to probe mechanics, dynamics, and forces inside living cells. Using these tools, we find that malignant cells exhibit a significantly enhanced level of intracellular forces, reflecting a more active cytoplasm, as compared to benign cells. Furthermore, I will show that the mechanical property of cells strongly correlates to cell volume. Over a wide range of perturbations, if the changes in cell volume are known then the effects upon cell stiffness can be predicted. Changing cell volume affects both the mechanics and the gene expression in the cell; it even impacts the differentiation of stem cells. These findings demonstrate the impact of cell volume and its changes on cell stiffness, and highlight the importance of cell volume on cell function.

TUESDAY, NOVEMBER 3, 2015
2:30 PM
Building E18, Room 466A

Reception following in Building E17, Room 401A
(Math Dept. Common Room)

http://math.mit.edu/pms/

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