



Department of Physics Colloquium

Friday, October 22, 2010 • 4:00 P.M. • 2241 Chamberlin Hall

cookies & coffee served at 3:30 p.m

Morphogen Gradient Formation in Subdiffusive Media



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Morphogens are signaling molecules that act directly on cells to produce specific cellular responses dependent on morphogen concentration. The morphogens are produced at a point in space at a constant rate, move around in the cell, and are also subject to degradation at a rate that may depend on location. The resulting morphogen concentration gradients determine which response is produced where in the cell or in a group of cells.

The shape of the gradient is obviously important in this process, and this shape is determined by the way the morphogens move and degrade in the cell. While different degradation processes have been considered in the literature, the motion of the morphogens is almost always assumed to be diffusive in spite of the barriers and traps presented by the crowded cellular environment. We explore the consequences of subdiffusive motion, that is, morphogen motion that is impeded by the obstacles in the environment. We conclude that morphogen concentration profiles are very sensitive not only to the details of the degradation process but also to the morphogen motion.