Physics Colloquium

Prof. Leah Edelstein-Keshet

"Mathematical and Computational Models for Cell Migration and Internal Signaling Dynamics"

The migration of mammalian cells is regulated by a complex intracellular signaling cascade. By controlling assembly of actin (a structural biopolymer) and activity of myosin (molecular motors that power contraction), that regulatory system affects the shape and motility of a cell, modulating its response to the environment. Cells migrate through a weave of fibers known as the extracellular matrix (ECM), interacting with it through adhesion bonds (intergrins). In this talk I will describe how we have tried to dissect some of the major components of the signaling pathways using mathematical analysis, and how we have used computational modelling to understand cell-ECM interactions and complex cell migration patterns, including oscillations and internal waves of activity seen experimentally in melanoma cells. If time permits, I will briefly describe recent work that aims to connect the behavior of single cells to that of multicellular tissues.

LEK received her PhD in Applied Mathematics (1982) from the Weizmann Institute of Science with Prof Lee A Segel. (Her husband, Joshua Keshet, is also a former student of Lee Segel, and their two boys, Aviv and Ilan, were raised on math puzzles and are now software engineers.) After several years at Brown and then Duke Universities, LEK became a faculty member in the Department of Mathematics at the University of British Columbia (1989). This department is among the most collegial and outstanding departments anywhere in the world. LEK served as president of the Society for Mathematical Biology (1995-97), as editorial board member of several journals (Biophysics J, Molec Biol of the Cell, J Theor Biol, and others), and as Scientific Advisory Board member of several institutes of Systems Biology and Complex Systems. She has enjoyed writing several books, the latest of which are self-published and open access.

Thursday April 15th at 4:25 via Zoom

If you are outside the Lehigh Physics Department, please email Professor Bitan Roy (bir218@lehigh.edu)