
TcSUH Bi-Weekly Seminar

Finding the Modular Structure of Genetic and Biophysical Networks



Prof. Kevin E. Bassler

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Thursday, March 21, 2019

Room 102, Houston Science Center
12:00 p.m. – 1:00 p.m.

ABSTRACT: With the quickly increasing amount of available biological data, it has become important to develop methods that can systematically use the data to discover biological structure and function. This knowledge has many applications, from personalized drug design to the development of heat or drought resistant crops. Often the data describes the behavior of a complex network of nodes and links, such as gene expression data that describes the behavior of genes (nodes) and contains information about their interactions (links). Finding the community, or modular, structure within a complex network is a topic that has interested physicists for some time. There are many possible definitions of community, but generally communities are groups of nodes that are more densely connected than what would occur randomly. Determining the community structure of a given network, however, is a computationally challenging optimization problem. Recent advances in developing robust and efficient methods for finding the modular structure of complex networks will be discussed, and results of various methods for finding the modular structure of gene regulatory networks will be compared. Results for a variety of organisms will be presented, including findings concerning modules that contain orphan genes. Methods and results concerning a related problem of finding dynamical communities in the collective motion of myosin motors that move melanosomes on a network of actin fibers in melanophores and melanocytes will also be discussed.

BIO: Prof. Bassler received his Ph.D. in Condensed Matter Physics from Carnegie Mellon University. He then held postdoctoral positions at Northwestern University, Virginia Tech and Louisiana State University before joining the faculty of UH. He is now Moore's Professor of Physics and Mathematics. He has received a number of awards for both his scholarship and teaching, including most notably a Sloan Research Fellowship, an Australian Research Council International Fellowship, and an American Physical Society Fellowship. His research focuses on non-equilibrium statistical mechanics and the behavior of complex systems, especially on the structure and dynamics of complex networks.

RSVP by Wednesday at Noon to bdherndo@central.uh.edu for Vietnamese sandwiches.

Persons with disabilities who require special accommodations to attend this lecture should call (713) 743-8213.
