Chez Pierre

Presents ...

Tuesday, February 10, 2009
1:15pm
MIT Room 4-331

Pankaj Mehta

Princeton University

"Information processing and signal integration in bacterial quorum sensing"

Bacteria communicate with each other using secreted chemical signaling molecules called autoinducers in a process known as quorum sensing. The quorum-sensing network of the marine-bacteria Vibrio harveyi utilizes three autoinducers, each encoding distinct ecological information. Yet, how cells integrate and interpret the information contained within multiple autoinducers remains a mystery. We develop a new framework for analyzing signal integration based on Information Theory and use it to analyze quorum sensing in Vibrios. We quantify how much Vibrio's can learn about individual autoinducers and explain the experimentally observed input-output relation of the V. harveyi quorum-sensing circuit. We predict that bacteria can increase information transmission by manipulating autoinducer production and experimentally verify that this is the case. Our work suggests that there may be strong functional constraints on the architecture and design of signal integration networks.