Abstract of Presentation

Presentation Title:

Criticality, robustness and evolvability in genetic regulatory networks.

Abstract:

To sustain functionality under random external perturbations, the global dynamics of the genetic network must possess two central properties. (a) It must be robust enough as to guarantee stability under a broad range of external conditions, and (b) it must be flexible enough to recognize and integrate specific external signals that may help the organism to change and adapt to different environments. This compromise between robustness and adaptability has been observed in dynamical systems operating at the brink of a phase transition between order and chaos. Such systems are termed critical. In this talk I investigate the dynamical properties of the gene transcription networks reported for five different organisms and show that, to the best of the current experimental data available, these five networks indeed operate close to criticality. This result suggests that genetic criticality might constitute a fundamental evolutionary mechanism that generates variability and robustness in living organisms.