Departments of Computer Science, Mathematics, Statistics and the Computation Institute

SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

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Error Correction and Noise Reduction in Gene Expression

THURSDAY, May 11, 2017 at 4:30 PM
226 Jones Laboratory, 5747 S. Ellis Avenue

ABSTRACT

A developing organism executes an exquisitely precise program of transcriptional control. This precision arises through multiple mechanisms that can be described by both deterministic and stochastic models. I will illustrate this point by discussing three topics. First, I will describe a remarkable experimental situation in which the transcriptional function of a single gene is conserved across species in the face of non-conservation of DNA sequence. A model of this process allows us to determine how this happens, and reveals the existence of codon-like structures in regulatory DNA. Second, I will show how developmental error correction arises from the action of as mall genetic network and the structure of attractors and bifurcations it gives rise to. Third, at the stochastic level, I will show how careful chemical interpretation of the exact solutions of the master equation for a self-repressing gene shed sometimes counterintuitive light on the minimal amount of noise that this system can have.

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