



The University of Chicago
Department of Statistics
Seminar Series

Faculty Recruitment Candidate

XIAO WANG

Department of Biomedical Engineering
Boston University

**Mathematical Modeling of Synthetic Networks Reveals
Noise-induced Gene Regulation Mechanisms**

THURSDAY, March 6, 2008 at 12:00 PM
110 Eckhart Hall, 5734 S. University Avenue

Joint seminar with BEN MAY DEPARTMENT FOR CANCER RESEARCH

ABSTRACT

Bistable systems are very common modules in natural biological systems. In this work, well-characterized biological components are used to construct a genetic toggle switch in *S. cerevisiae* through mutual inhibition. Mathematical modeling is combined with molecular biology to design and construct the genetic toggle switch. We show that, guided by modeling predictions, we can achieve bistability by tuning the system. I will illustrate the artificial “cell differentiation”, both experimentally and mathematically, by starting the switch from a specific initial condition that expressions of both repressors are turned off. This work demonstrates the use of synthetic gene networks to uncover general regulatory mechanisms in natural biological systems.