Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Control of State Transitions in Complex and Biophysical Networks[1] ADILSON MOTTER, DANIEL WELLS, WILLIAM KATH, Northwestern University — Noise is a fundamental part of intracellular processes. While the response of biological systems to noise has been studied extensively, there has been limited understanding of how to exploit it to induce a desired cell state. Here I will present a scalable, quantitative method based on the Freidlin-Wentzell action to predict and control noise-induced switching between different states in genetic networks that, conveniently, can also control transitions between stable states in the absence of noise. I will discuss applications of this methodology to predict control interventions that can induce lineage changes and to identify new candidate strategies for cancer therapy. This framework offers a systems approach to identifying the key factors for rationally manipulating network dynamics, and should also find use in controlling other classes of complex networks exhibiting multi-stability. Reference: D. K. Wells, W. L. Kath, and A. E. Motter, Phys. Rev. X 5, 031036 (2015).

[1]Work funded by CBC, NCI, NIGMS, and NSF.

Adilson Motter
Northwestern University

Date submitted: 30 Nov 2015 Electronic form version 1.4