Andrew R. Missel

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Research Interests

I am interested in systems in which both external and internal noise play important roles, such as reaction-diffusion systems with spatially inhomogeneous reaction rates and the random-field Ising model at finite temperature. I have a particular interest in models with potential applications to biological systems, especially those systems which can be studied under laboratory conditions. My research to date has involved the use of both analytical methods and computer simulations, and I hope to continue to employ both sets of tools in the future.

Education

Ph.D. Physics, University of Illinois, Urbana-Champaign, 2008 (Expected)

M.S. Physics, University of Illinois, Urbana-Champaign, 2005

A.B. Physics, Cornell University, 2003, *cum laude*

Research Experience

Graduate Research Assistant — 2004–Present
Advisor: Professor Karin Dahmen — UIUC

In my current research, I am studying noise-induced transport in disordered reaction-diffusion systems using both simulations and a variety of analytical tools drawn from percolation theory, the theory of first-passage processes, and the theory of front propagation in disordered materials. The system I am studying has been used to model the population dynamics of bacteria in an agar gel under spatially inhomogeneous UV light as well as plankton populations in the oceans.

Undergraduate Research Assistant (through NSF REU program) — Summer 2002
Advisor: Professor Jonathan Arnold — University of Georgia

In this summer research project, I studied a bistable genetic regulatory network using both computational and analytical tools.

Undergraduate Research Assistant — Spring 2002
Advisor: Professor Albert Sievers — Cornell University

While working in Professor Sievers' lab for one semester in college, I wrote code in LabView to create a lock-in amplifier for use in double-modulated infrared Fourier Transform spectroscopy.

Undergraduate Research Assistant (through NSF REU program) — Summer 2001
Advisor: Eric Smith — Cornell University

In this summer research project, I tested the properties of thick-film resistors to determine whether they could be used as thermometers for the new "wigglers" then being planned for the Cornell Electron Storage Ring.

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Teaching Experience

Graduate Teaching Assistant — Fall 2003–Present (8 terms)
Physics Department — UIUC
I have taught both lab and discussion sections for thermal/statistical physics, quantum physics, and classical mechanics while enrolled in the Ph.D. program at UIUC.

Private Physics Tutor — Fall 2005–Present
UIUC
I have tutored UIUC students taking various physics courses for the past three years.

Physics Tutor — Spring 2002–Spring 2003
Learning Strategies Center — Cornell University
As a tutor for the LSC's walk-in physics tutoring service, I was expected to be able to help students taking a wide variety of physics classes at many levels of mathematical sophistication.

Honors and Awards

L.S. Edelheit Family Biological Physics Fellowship, Physics Deparment, UIUC, 2008

Finalist for the APS Group for Statistical and Nonlinear Physics (GSNP) Student Speaker Award at the APS March Meeting, 2008

"Incomplete List of Teachers Ranked as Excellent by Their Students" at UIUC (5 times)

GAANN Fellowship, Physics Deparment, UIUC, 2003-2004

Publications

A. Missel and K. Dahmen, "Hopping Transport in Hostile Reaction-Diffusion Systems," *in preparation for submission to* Phys. Rev. E

A. Missel and K. Dahmen, "Hopping Conduction and Bacteria: Transport in Disordered Reaction-Diffusion systems," *Phys. Rev. Lett.* **100**, 058301 (2008)

Conference Presentations

"Bacteria, Hopping Conduction, and First-Passage Percolation," 8$^{\text{th}}$ Understanding Complex Systems Symposium, UIUC, May 15, 2008.

"Hopping Conduction and Bacteria: Transport in Disordered Reaction-Diffusion Systems," Sessions B9 and H29 at the APS March Meeting, New Orleans, LA, March 2008.

"Hopping Conduction and Bacteria: Transport in Hostile Reaction-Diffusion Systems," 7$^{\text{th}}$ Understanding Complex Systems Symposium, UIUC, May 16, 2007.

"Transport in Disordered Reaction-Diffusion Systems," Session H29 at the APS March Meeting, Denver, CO, March 6, 2007.

Posters

"Population Dynamics in Inhomogeneous Media," Institute for Genomic Biology (IGB) Symposium, UIUC, April 2007.

"Population Dynamics in Disordered Media," 6$^{\text{th}}$ Understanding Complex Systems Symposium, UIUC, May 15, 2006.