Maksim Sipos

Contact Information

Department of Physics
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Objectives

To apply my analytical and computational skills to interesting problems in quantitative research. I am interested to work with exciting technologies, large datasets and heterogeneous databases combining mathematical, statistical and computational methods.

Education

University of Illinois at Urbana-Champaign **2008–2012**

Ph.D. in Physics
Thesis: Phase Transitions in Fluids and Biological Systems
Thesis advisor: Nigel Goldenfeld

Ithaca College **2004–2008**

B.A. in Mathematics with Honors
Thesis: Dynamical Plane Structures in the Parameter Plane of Cosine–Root Family

B.S. in Physics with Honors
Thesis: Optics and Cloaking in FDTD

Employment Experience

Teaching Assistant, Research Assistant, University of Illinois **Fall 2009 – Present**

Taught discussion sections for introductory Physics courses for non–majors (101) and for majors and engineers (212). Designed, programmed and performed high–performance numerical experiments and performed mathematical analysis in physics and quantitative biology. Mentored and taught junior graduate students and was system administrator for the group.

Intern Software Engineer, Grammatech **Spring 2007 – Spring 2008**

Helped develop the latest version of Grammatech's flagship product, CodeSonar. Wrote software in C and Python (Django). Also improved the company's automated testing framework.

Honors and Awards

- Excellence in Teaching, Outstanding Rating (top 10% of TAs) – University of Illinois (6 semesters)
- 2012 L.S. Edelheit Family Fellowship in Biophysics – University of Illinois
- Institute for Condensed Matter Theory First–Year Fellowship (2008–2009)
- Honorable Mention, Mathematical Competition in Modeling (3 times)
- Top Participant, William Lowell Putnam Math Competition (2006)
- DANA Undergraduate Research Fellow (2 times)
- President's Scholar – Ithaca College
- Honorary societies: Sigma Xi (Research), Sigma Pi Sigma (Physics) and Pi Mu Epsilon (Math)

Computing Skills

- Developed Tornado (tornado.igb.uiuc.edu), a web-based pipeline for processing and analysis of RNA metagenomics datasets (in C, C++ and Python).
- Developed ripe (http://github.com/msipos/ripe), a hybrid dynamically-statically typed high-level programming language (in C, Lex, Yacc).
- Developed various small libraries and tools available at http://bitbucket.org/msipos.
- Languages: Java, C, C++, Python, Ruby, Scheme, Matlab/Octave, JavaScript/CoffeeScript.
- Other: LaTeX, HTML/CSS, Bash, Git, Subversion.

Publications

1. M. Sipos, B. G. Thompson. Electrodynamics on a grid: The finite-difference time-domain method applied to optics and cloaking. Am. J. Phys. 76, Issue 4, 464–469 (2008).
2. S. Yildirim, C. Yeoman, M. Sipos, M. Torralba, B. Wilson, T. Goldberg, R. Stumpf, S. Leigh, B. White, K. Nelson. Characterization of Fecal Microbiome from Non-human Wild Primates Reveals Species Specific Microbial Communities. PLoS ONE 5, Issue 11, e13963 (2010).
3. M. Sipos, P. Jeraldo, N. Chia, A Qu, A. S. Dhillon, M. E. Konkel, K. E. Nelson, B. A. White and N. Goldenfeld. Robust computational analysis of rRNA hypervariable tag datasets. PLoS ONE 5, Issue 12, e15220 (2010).
4. M. Sipos and N. Goldenfeld. Directed percolation describes lifetime and growth of turbulent puffs and slugs. Phys. Rev. E Issue 84, 035304(R) (2011).
5. P. Jeraldo* , M. Sipos* , N. Chia, J.M. Brulc, A.S. Dhillon, M.E. Konkel, C.L. Larson, K.E. Nelson, A. Qu, L.B. Schook, F. Yang, N. Goldenfeld, and B.A. White. Quantifying the Role of Neutral and Niche Processes in Evolution. Proceedings of the National Academy of Sciences 109 (2012) no. 25 9692–9698 (* indicates equal contribution.)
6. T. Pfaff, M. Sipos, M.C. Sullivan, B.G. Thompson, M. Tran. The Use of Statistics in Experimental Physics. Accepted for publication in Mathematics Magazine in September 2012.

Talks and Poster Presentations

1. *Robust Computational Analysis of rRNA hypervariable tag datasets.* Poster presented at Institute for Genomic Biology Fellows Symposium. April 2010.
2. *Rare Fluctuations and Cascades in Turbulence and Ecology.* Talk given at UIUC PGSA Colloquium. December 2010.
3. *The relative role of niche and neutral processes in structuring gastrointestinal microbiomes.* Talk given at the Center for the Physics of Living Cells Symposium. February 2011.
4. *Directed Percolation Transition in Pipe Flow Turbulence.* Talk given at UIUC Chemical and Biomolecular Engineering Graduate Student Colloquium. April 2011.
5. *From 16S rRNA datasets to characterization of neutral and niche ecology in microbiomes.* Talk given at Physics of Living Systems (POLS) workshop and a poster presented at International Conference on Biological Physics (San Diego, USA). June 2011.
6. *Directed Percolation Describes Lifetime and Growth of Turbulent Puffs and Slugs.* Poster presented at the Boulder School of Condensed Matter and Materials Physics. July 2011.