

Vadas Gintautas

CONTACT INFORMATION

Center for Nonlinear Studies and T-5
Theoretical Division
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RESEARCH INTERESTS

Computational and theoretical neuroscience, information theory, neural networks, biological networks, biophysics, nonlinear dynamics, machine learning, artificial intelligence.

TECHNICAL SKILLS

- Software: Python, C, Fortran, Mathematica, parallel programming, Linux, OS X, Windows.
- Hardware: Circuit design and building, electronics, machine tools, 3D visualization systems

EDUCATION

University of Illinois at Urbana-Champaign, Urbana, Illinois

Ph.D., Physics, 2008
M.S., Physics, 2006

University of North Carolina at Chapel Hill, Chapel Hill, North Carolina

B.S., Physics (with Honors and Highest Distinction), 2004
B.A., Mathematics (with Highest Distinction), 2004

HONORS AND AWARDS

- Travel grant for *SBP 2009*: AFOSR, ARL, NIH, NSF, and ONR.
- Travel grant for *Engineering Principles in Biological Systems 2008*: CSHL, CIT, NSF.
- Intelligence Community Postdoctoral Research Fellowship, 2008 - 2009
- Travel grant for *Dynamics Days 2008*: ORNL, ARO, ONR, UT, APS.
- Scott Anderson Award for Outstanding Teaching Assistant, UIUC Physics Dept., 2007
- Graduate teaching awards based on student evaluations, 2004 - 2007
- Phi Beta Kappa, 2004
- Daniel C. Johnson Award for Outstanding Junior, UNC-CH Dept. of Physics, 2003
- UNC-CH Dean's List, 2000 - 2004
- National Merit Scholarship, 2000 - 2004

PUBLICATIONS

- [1] L. M. A. Bettencourt, **V. Gintautas**, and M. I. Ham. Identification of functional information subgraphs in complex networks. *Phys. Rev. Lett.*, 100, 238701, 2008.
- [2] M. I. Ham, **V. Gintautas**, M. A. Rodriguez, R. A. Bennett, C. L. Santa Maria, and L. M. A. Bettencourt. Density-dependence of functional development in spiking cortical networks grown in vitro. To appear soon in *Biological Cybernetics*, 2009.
- [3] **V. Gintautas**, A. E. Champagne, F. G. Kondev, and R. Longland. Thermal equilibration of ^{176}Lu via K mixing. *Phys. Rev. C*, 80, 015806, 2009.
- [4] **V. Gintautas**, A. Hagberg, and L. M. A. Bettencourt. When is social computation better than the sum of its parts? In H. Liu, J. J. Salerno, and M. J. Young, editors, *Social Computing, Behavior Modeling, and Prediction*, 2009.
- [5] **V. Gintautas** and A. Hübler. A simple, low-cost, data-logging pendulum built from a computer mouse. *Physics Education*, 44, 488, 2009.
- [6] M. A. Rodriguez, **V. Gintautas**, and A. Pepe. The relationship between concert and listening behavior: a Grateful Dead analysis. *First Monday [Online]*, 14(1), 2009.
- [7] **V. Gintautas** and A. W. Hübler. Resonant forcing of nonlinear systems of differential equations. *Chaos*, 18, 033118, 2008.

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- [8] **V. Gintautas**, G. Foster, and A. W. Hübler. Resonant forcing of chaotic dynamics. *J. Stat. Phys.*, 130, 617, 2008.
 - [9] A. W. Hübler and **V. Gintautas**. Experimental evidence for mixed reality states. *Complexity*, 13, 7, 2008.
 - [10] M. I. Ham, **V. Gintautas**, and G. Gross. Spontaneous coordinated activity in cultured networks: Analysis of multiple ignition sites, primary circuits, burst phase delay distributions and functional structures. In *6th International Meeting on Substrate-Integrated Micro Electrode Arrays*, 2008.
 - [11] **V. Gintautas** and A. W. Hübler. Experimental evidence for mixed reality states in an inter-reality system. *Phys. Rev. E*, 75, 057201, 2007.
 - [12] V. A. Hackley, L. S. Lum, **V. Gintautas**, and C. F. Ferraris. Particle size analysis by laser diffraction spectrometry: application to cementitious powders. NISTIR 7097, 2004.

PAPERS IN
PREPARATION

- [1] **V. Gintautas**, B. Kunsberg, and G. Kenyon. A model of lateral connectivity in V1 for contour completion.
- [2] **V. Gintautas**, L. M. A. Bettencourt, and M. I. Ham. Information theoretical analysis methods for cultured neuronal networks.
- [3] **V. Gintautas**, A. Hagberg, and L. M. A. Bettencourt. Synergy-based infotaxis motion of swarms.
- [4] **V. Gintautas** and A. W. Hübler. Dynamics of a charged particle near a rough conducting surface.

INVITED TALKS

- [1] Better living through interreality. IgniteSF, Santa Fe, New Mexico, 2009.
- [2] Resonant forcing of systems of differential equations. Plenary talk, Understanding Complex Systems Symposium, Urbana, Illinois, 2008.

CONFERENCE
PRESENTATIONS
AND PROCEEDINGS

- [1] Identification of functional information subgraphs in complex networks. Eighteenth Annual Computational Neuroscience Meeting CNS*2009, Berlin, Germany, 2009.
- [2] When is social computation better than the sum of its parts? Social Computing, Behavior Modeling, and Prediction, Phoenix, Arizona, 2009.
- [3] Not so fast: Optimized masks increase processing time for object detection on speed-of-sight tasks. Society for Neuroscience Annual Meeting, Chicago, Illinois, 2009.
- [4] Image categorization through large-scale hierarchical models of the primate visual cortex. Society for Neuroscience Annual Meeting, Chicago, Illinois, 2009.
- [5] Preliminary results from the comparison of human visual performance to biologically inspired computer object categorization. Decade of the Mind IV, Albuquerque, New Mexico, 2009.
- [6] Roughness-dependent dynamics of a point charge near a conducting plane. Dynamics Days, San Diego, California, 2009.
- [7] Identification of functional information subgraphs in complex networks. Engineering Principles in Biological Systems, Cold Spring Harbor, New York, 2008.
- [8] Resonant forcing of chaotic dynamics. Dynamics Days, Knoxville, Tennessee, 2008.
- [9] Experimental evidence for mixed reality states in an interreality system. Understanding Complex Systems Symposium, Urbana, Illinois, 2007.
- [10] Arnold tongue mixed reality states in an interreality system. APS March Meeting, Denver, Colorado, 2007.

- [11] Particle size analysis by laser diffraction spectrometry: Application to cementitious powders. The Fourth Annual Celebration of Undergraduate Research, UNC, Chapel Hill, North Carolina, 2003.

Los Alamos National Laboratory, Los Alamos, New Mexico
Center for Nonlinear Studies, Theoretical Division

Postdoctoral Research Associate, August 2008 - present

Performs large-scale simulations of the human visual cortex.

Visiting Graduate Student, Summer 2007; January 2008 - August 2008

Performs information theoretical analysis of action potential time series from cortical neuronal networks grown in vitro.

Oak Ridge National Laboratory, Oak Ridge, Tennessee
Center for Engineering Science Advanced Research, Computer Science and Mathematics Division

Graduate Research Assistant, Fall 2007

Performed theoretical and computational analysis of nonlinear dynamical systems.

University of Illinois at Urbana-Champaign, Urbana, Illinois
Center for Complex Systems Research, Department of Physics

Graduate Student, 2004 - 2008

Performed research in nonlinear dynamics as part of Ph.D. work.

Duke University, Durham, North Carolina
Laboratory for Experimental Nuclear Astrophysics, Department of Physics

Undergraduate Research Assistant, Spring 2004

Repaired, maintained, and tuned electron cyclotron resonance equipment as part of a 200-kV proton accelerator.

University of North Carolina at Chapel Hill, Chapel Hill, North Carolina
Department of Physics and Astronomy


Undergraduate Research Assistant, Fall 2002

Developed sample preparation methods and performed AFM analysis on polymers.

National Institute of Standards and Technology, Gaithersburg, Maryland
Materials Science Laboratory, Ceramics Division

Summer Undergraduate Research Fellow, Summer 2002

Analyzed particle dispersion methods and particle size distribution measuring methods.

 TEACHING
EXPERIENCE

University of Illinois at Urbana-Champaign, Urbana, Illinois
Department of Physics

Teaching Assistant, August 2004 - May 2008

Led up to four sections per week. Prepared lessons, held office hours and graded assignments.

- 435 Electromagnetic Fields I, Spring 2005.
- 436 Electromagnetic Fields II, Spring 2005.
- 212 Introduction to Electricity and Magnetism (Lab), Fall 2004.
- 199HO Honors Seminar: Topics in Electricity and Magnetism, Fall 2005 - Spring 2007.
- 199HM Honors Seminar: Topics in Mechanics, Spring 2006 - Spring 2007.
- 199M Enrichment Electricity and Magnetism, Fall 2006.

Graduate Research Assistant in Physics Education Research, May 2005 - August 2006

Developed and revised course materials. Analyzed student interaction with online courseware.

University of North Carolina at Chapel Hill, Chapel Hill, North Carolina
Department of Physics and Astronomy and Department of Mathematics

Supplemental Instruction Leader, Spring 2004

Lead three supplemental instruction sessions per week for a beginning mechanics class.

Undergraduate Laboratory Development Associate, Spring 2002 - Summer 2003

Revised undergraduate laboratory curriculum for computer automation. Analyzed student performance on exams.

Math and Physics Tutor and Grader, Spring 2001 - Fall 2003

Tutored informally and formally in UNC-CH Math Help Center.

 MEMBERSHIPS

- Society for Neuroscience, 2009 - present
- Toastmasters International, 2007 - present
- American Physical Society, 2006 - present
- Physics Van Outreach Program at UIUC (demonstrates physics at local schools), 2004 - 2007
- Dancing Illini at UIUC (teaches weekly ballroom dance classes), 2004 - 2007
- Pi Mu Epsilon Mathematics Honors Society, 2004 - present
- UNC-CH Honors Program, 2000 - 2004
- UNC-CH Society of Physics Students, 2000 - 2004
- UNC-CH Ballroom Dance Team (Captain, with nine 1st place wins), 2000 - 2004

References as well as copies of publications are available upon request.