

Curriculum Vitae
WOODROW LEE SHEW
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Born Hamlin, West Virginia, United States of America, 20th of September, 1976

· ◦ **EDUCATION** ◦ ·

1999 → **2004** Ph.D., Physics, University of Maryland
College Park, Maryland, USA
1994 → **1998** BA, Physics, College of Wooster
Wooster, Ohio, USA

· ◦ **EMPLOYMENT** ◦ ·

2006 → **NOW** Postdoctoral fellow, Neuroscience, National Institutes of Health
2004 → **2006** Postdoctoral fellow, Physics, École Normale Supérieure de Lyon
2000 → **2004** Graduate research assistant, Physics, University of Maryland
2000 → **2004** Volunteer tutor, FOCUS-Beacon House, Washington D.C.
1999 → **2000** Graduate teaching assistant, Physics, University of Maryland
1998 → **1999** Laboratory technician, Physics, University of San Francisco
1994 → **1998** Laboratory technician, Physics, College of Wooster

· ◦ **MEMBERSHIPS & HONORS** ◦ ·

2010 NIH Fellow Award for Research Excellence
NIH Postdoctoral Intramural Research Training Award
Society for Neuroscience since 2007
Centre Nationale de la Recherche Scientifique Postdoctoral Fellowship
École Normale Supérieure Postdoctoral Fellowship
National Science Foundation International Research Fellowship
American Physical Society since 2000
groups: Statistical and Nonlinear Physics, Biological Physics, Division of Fluid Dynamics
Best IREAP graduate seminar
Phi Beta Kappa
Graduated cum laude with departmental honors from College of Wooster
Arthur H. Compton Award in Physics at College of Wooster

· ◦ **MENTORSHIP** ◦ ·

2009 Summer school teaching – Biophysics, Hands-on Complex Systems Research School, UFABC,
Brazil

2007 → **NOW Graduate student** – Neuroscience, University of Maryland/NIH

- 2006 → NOW **Graduate student** – Neuroscience, Brown University/NIH
- 2005 → 2006 **Undergraduate student** – Physics, Ecole Normale Superieure, Lyon
- 2003 **Graduate student** – Physics, University of Maryland
- 2001 → 2002 **Undergraduate student** – Physics, University of Maryland
- 2001 **Masters student** – Physics, University of Maryland

. ◦ **ONGOING NEUROSCIENCE RESEARCH** ◦ .

- 2009 → NOW **Balance of excitation/inhibition, network-level etiology of autism** – Recently began collaborations with intramural NIH investigators, Drs. J. Crawley and A. Martin, to test the hypothesis that autistic persons and rodent models of autism have abnormal sensory experiences due to an imbalance of excitation and inhibition in sensory cortex.
- 2006 → NOW **Neurons participate selectively in cortical cell assemblies** – Based on *multi-electrode array recordings in awake monkeys* as well as in vitro rat cortex, we showed that any given single neuron participates reliably in only a select few cell assemblies. We found that both population coding and firing rate coding coexist in these cortical dynamics. (*Manuscript in preparation*)
- 2006 → NOW **Postnatal development of network-level balance of excitation/inhibition and cortical synchrony** – Using *in vivo multi-electrode array measurements in rat somatosensory cortex* and in vitro cortex preparations, we showed that an abrupt increase in the ratio of excitation/inhibition occurs between postnatal days 10-12. This change coincided with an increase in network-level phase synchrony and the critical period for somatosensory system development. (*Manuscript in preparation*)
- 2007 → 2009 **Neuronal avalanches coincide with optimized brain function** – With experiments and *computational modelling*, we confirmed the hypothesis that neural networks that generate spontaneous activity in the form of neuronal avalanches are capable of responding to the largest range of input stimuli. I established a collaboration with physicist (Prof. R. Roy) from U. Maryland. (*Manuscript under review at J. Neurosci.*)
- 2006 → 2008 **Novel technique for network-level investigation of cortex** – Developed *simultaneous two-photon calcium imaging and multi-electrode array (MEA) recordings*. This multi-scale approach allows recording of neural activity of many thousands of neurons with single-cell resolution within a sub-population. (*Manuscript submitted to Nature Methods.*)

. ◦ **PAST PHYSICS RESEARCH** ◦ .

- 2005 → 2007 **Smart particles** – Invented novel miniature, “smart” flow tracer particles with on-board RF communication and sensors. Conducted first experimental temperature measurements from such a mobile sensor. Device is now PATENTED. Featured on COVER OF PHYSICAL REVIEW LETTERS.
- 2004 → 2006 **Bubble dynamics** – Used ultrasound technique and high speed video to make precise measurements of single bubble motion over many meters with sub-millimeter precision. Developed a computational model for bubble path instability.
- 2001 → 2004 **Laboratory-sized Earth’s core** – Designed and built a rapidly rotating, liquid metal, thermal convection apparatus to emulate Earth’s core. At the time, these experiments were the nearest match to core-like conditions ever investigated in a laboratory. FEATURED ON NOVA.
- 2000 → 2002 **Magneto-turbulence**– Studied how turbulence in liquid metal becomes ordered when subjected to large magnetic fields (0.5 T) to gain insight on the magnetic field of the Earth and Sun.

1997 → 1998 Controlling chaos with disorder in coupled oscillators – Designed and built an array of spring-coupled pendulums to investigate how chaotic network dynamics can be controlled.

· ○ **PATENTS** ○ ·

2008 *In situ monitoring and control of mixing processes*: Demande de brevet francais # 08 00682.

· ○ **INVITED PRESENTATIONS** ○ ·

Neuronal avalanches and dynamic range of the brain.

2009 NOV Intntl Workshop: Synchronization and Multiscale Complex Dynamics in the Brain , Max Plank Institute *Dresden, Germany*

2009 SEP NIMH Scientific Retreat, *Gettysburg, PA*

2009 FEB Neurobiology Interest Group Seminar, NIH, *Bethesda, MD*

2009 JAN Physics Colloquium, Emory University, *Atlanta, GA*

2009 JAN Physics Colloquium, University of Texas, *Austin, TX*

2008 OCT MURI meeting, University of Maryland, *College Park, MD*

2007 NOV Physics Colloquium, University of North Carolina, *Chapel Hill, NC*

Simultaneous micro-electrode array recording and two-photon imaging.

2009 OCT Society for Neuroscience meeting, *Chicago, IL*

Information processing in biological networks.

2009 AUG Hands-On School in Complex Systems, *Sao Paulo, Brazil*

Dynamo experiments: bringing Earth's core into the lab.

2007 DEC Physics Colloquium, College of Wooster, *Wooster, OH*

Smart Particles.

2007 SEP MURI meeting, University of Maryland, *College Park, MD*

2007 MAY Physics Colloquium, Georgetown University, *Washington, D.C.*

Physical Mechanisms of Bubble Path Instability.

2006 SEP École Centrale, *Lyon, France*

2005 SEP Applied Dynamics Seminar, University of Maryland, *College Park, Maryland, US*

2005 JUN Hydrodynamics of Bubbly Flows workshop, *Leiden, Netherlands*

Liquid Sodium Model of Earth's Outer Core.

2005 JAN Universite Joseph Fourier, LGIT, *Grenoble, France*

2004 NOV University of Twente, *Enschede, Netherlands*

2004 OCT École Normale Supérieure de Lyon, *Lyon, France*

2004 MAY European Geophysical Union Meeting, *Nice, France*

· ◦ **SKILLS** ◦ ·

Languages English, French, Matlab, C, PIC machine code

LabTechniques In vivo rat micro-electrode array recording, two-photon microscopy, micro-electrode arrays in acute slice, patch-clamp recording, radio-frequency electronics, IR optical communication, ultrasonic particle tracking, high speed video processing

Software Matlab, Labview, Autocad, Adobe Illustrator, Microsoft Excel