

Michael A. Schwemmer

CONTACT INFORMATION	Mathematical Biosciences Institute The Ohio State University Office: 379 Jennings Hall 1735 Neil Avenue Columbus, OH 43206 USA	Office Phone: (614) 688-3443 Dept. Fax: (614) 247-6643 E-mail: schwemmer.2@osu.edu people.mbi.ohio-state.edu/schwemmer.2
RESEARCH INTERESTS	I work in mathematical biology, specifically, developing and analyzing mathematical models in neuroscience and psychology. Using asymptotic methods, numerical simulations, bifurcation theory, and deterministic and stochastic dynamical systems, I seek to illuminate underlying mechanisms, and motivate and guide further experimentation.	
EDUCATION	University of California-Davis, Davis, California, USA Ph.D., Applied Mathematics, August 2010 Adviser: Professor Timothy J. Lewis Area of Study: Mathematical Neuroscience Queens College, CUNY, Flushing, New York, USA B.A., Mathematics, June 2005 <i>Magna cum Laude</i> Phi Beta Kappa	
ACADEMIC APPOINTMENTS	Postdoctoral Fellow Mathematical Biosciences Institute, The Ohio State University	September 2012 to Present
	Postdoctoral Research Fellow Program in Applied and Computational Mathematics, Princeton Neuroscience Institute, Princeton University	September 2010 to August 2012
	NSF VIGRE Research Fellow Department of Mathematics, University of California, Davis	September 2005 to August 2010
REFEREED JOURNAL ARTICLES	Schwemmer MA, Fairhall AL, Denéve S, and Shea-Brown E. Constructing precisely computing networks with biophysical spiking neurons. <i>J. Neurosci.</i> 2015. doi: 10.1523/JNEUROSCI.4951-14.2015 Davison P, Leonard NE, Olshevsky A, and Schwemmer MA. Nonuniform Line Coverage from Noisy Scalar Measurements. <i>IEEE T. Automat. Contr.</i> 2015. doi: 10.1109/TAC.2014.2375732 Newby JM and Schwemmer MA. Effects of moderate noise on a limit cycle oscillator: Counterrotation and bistability. <i>Phys. Rev. Lett.</i> 2014. doi: 10.1103/PhysRevLett.112.114101 Feng SF, Schwemmer MA, Gershman SJ, and Cohen JD. Multitasking vs. multiplexing: Toward a normative account of capacity constraints in cognitive control. <i>Cogn. Affect. Behav. Ne.</i> 2014. doi: 10.3758/s13415-013-0236-9	

	Schwemmer MA and Lewis TJ. The Robustness of Phase-Locking In Neurons with Dendro-Dendritic Electrical Coupling <i>J. Math. Biol.</i> 2014. doi: 10.1007/s00285-012-0635-5
	Goldfarb S, Wong-Lin K, Schwemmer M, Leonard NE and Holmes P. Can post-error dynamics explain sequential reaction time patterns? <i>Front. Psychology</i> 2012. doi: 10.3389/fpsyg.2012.00213
	Schwemmer MA and Lewis TJ. Bistability in a Leaky Integrate-and-Fire Neuron with a Passive Dendrite. <i>SIAM J. Appl. Dyn. Syst.</i> 2012. doi: 10.1137/110847354
	Schraiber JG, Silverstein R, Kaczmarczyk AN, Rutaganira RU, Aggarwal T, Schwemmer MA, Hom CL, Grossberg RK and Schreiber SJ. Constraints on the use of lifespan shortening Wolbachia to control dengue fever. <i>J. Theor. Biol.</i> 2012. doi: 10.1016/j.jtbi.2011.12.006
	Schwemmer MA and Lewis TJ. Effects of Dendritic Load on the Firing Frequency of Oscillating Neurons. <i>Phys. Rev. E</i> , 83:031906. 2011. doi: 10.1103/PhysRevE.83.031906
BOOK CHAPTERS	Lewis TJ and Schwemmer MA. Weak Coupling Theory. In: <i>Encyclopedia of Computational Neuroscience</i> . (Jaeger D and Jung R eds.), Springer. 2014. doi: 10.1007/978-1-4614-7320-6_271-1
	Netoff T, Schwemmer MA, and Lewis TJ. Experimentally Estimating Phase Response Curves of Neurons: Theoretical and Practical Issues. In: <i>Phase Response Curves in Neuroscience: Theory, Experiment, and Analysis</i> . (Schultheiss N, Butera R, and Prinz A eds.), Springer. 2012. doi: 10.1007/978-1-4614-0739-3_5
	Schwemmer MA and Lewis TJ. The Theory of Weakly Coupled Oscillators. In: <i>Phase Response Curves in Neuroscience: Theory, Experiment, and Analysis</i> . (Schultheiss N, Butera R, and Prinz A eds.), Springer. 2012. doi: 10.1007/978-1-4614-0739-3_1
CONFERENCE PAPERS	Davison P, Schwemmer M, and Leonard NE. Distributed nonuniform coverage with limited scalar measurements. <i>Proc. Allerton Conf. Communication, Control and Computing</i> . 2012. doi: 10.1109/Allerton.2012.6483390
SUBMITTED PAPERS	Schwemmer MA and Newby JM. The dynamics of bistable switching behavior in limit cycle systems with additive noise.
	Schwemmer MA, Feng SF, Holmes PJ, Cohen JD, and Gottlieb J. A multi-area stochastic model for a covert visual search task.
	Saparov A and Schwemmer MA. Effects of passive dendritic tree properties on the firing dynamics of a leaky-integrate-and-fire neuron.
PAPERS IN PREPARATION	Newby JM, Schwemmer MA, and Thomas PJ. On the stochastic definition of phase in the limit of weak noise.
	Shen T, Schwemmer MA, Groten R, Feth D, Ludvig EA, and Leonard NE. Dynamics of human continuous-time shared decision-making.

CONFERENCE ABSTRACTS	<p>Schwemmer MA, Denève S, Fairhall A, and Shea-Brown E. How precise can we make a biophysical neural integrator? Poster Abstract. Computational and Systems Neuroscience (Cosyne) 2014.</p> <p>Todd MT, Botvinick MM, Schwemmer MA, Cohen JD, and Dayan P. Rational Analysis of Task Switching. Program No. 194.21, 2011 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2011. Online. Poster Abstract.</p> <p>Feng SF, Schwemmer MA, Gershman SJ, Holmes PJ, and Cohen JD. Computational Constraints on Cognitive Control. Program No. 930.27, 2011 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2011. Online. Poster Abstract.</p> <p>Schwemmer MA and Lewis TJ. Effects of Passive Dendritic Properties on the Dynamics of an Oscillating Neuron. <i>BMC Neuroscience</i>, 9:P120 2008. CNS 2008, July, 2008. Poster abstract.</p>
SUBMITTED GRANTS	<p>NSF DMS-Mathematical Biology 2013 Title: Topological Pressure and the Importance of Spatio-Temporal Interactions in Neural Decoding. Principal Investigators: D. Koslicki and M.A. Schwemmer Status: Declined</p>
TEACHING EXPERIENCE	<p><i>Sample student evaluations available upon request</i></p> <p>The Ohio State University Department of Mathematics <i>Instructor</i> MATH 1156: Calculus for the Biological Sciences Fall 2013</p> <p>Princeton University Department of Mathematics <i>Instructor</i> MAT 342: Numerical Methods Spring 2012 <i>Instructor</i> MAT 351: Mathematical Neuroscience Spring 2011</p> <p>University of California-Davis Department of Neurobiology, Physiology, and Behavior <i>Teaching Assistant</i> NPB 267/167: Computational Neuroscience Fall 2009</p> <p>Department of Evolution and Ecology <i>Teaching Assistant</i> 2008-2009 Collaborative Learning at the Interface of Mathematics and Biology (CLIMB) Program</p> <p>Department of Mathematics <i>Associate Instructor</i> MAT 22B: Differential Equations Summer 2008 <i>Teaching Assistant</i> 2006 - 2010 MAT 17A and 17C: Calculus for Biology and Medicine (Fall 2006 and Spring 2008), MAT 119A: Ordinary Differential Equations (Winter 2007), and MAT 124: Mathematical Biology (Spring 2008 and Spring 2010).</p>
UNDERGRADUATE MENTORING	<p>The Ohio State University MBI Summer Undergraduate REU Program May 2013 Introduced students to programming in Matlab and XPP. Lead several students in a group project on computational neuroscience.</p>

Princeton University

Abulhair Saparov, B.S.E. Computer Science

2011 - 2013

PACM Applied Math Certificate Work

Awarded the PACM Certificate Prize.

Joel Shor, B.S. Mathematics

2011

Junior Independent Work

**AWARDS AND
HONORS**

Best Graduate Student Poster Award

SIAM Conference on the Life Sciences (LS10)

Pittsburgh, PA. 07/2010

Alice Leung Scholarship in Mathematics

University of California, Davis, CA. 06/2010

Floyd and Mary Schwall Dissertation Year Fellowship in Medical Research

University of California, Davis, CA. 09/2009–06/2010

Samuel Jacobs Award for Excellence in Mathematics

Queens College, CUNY, Flushing, NY. 05/2005

CUNY Honors College Scholar

Queens College, CUNY, Flushing, NY. 08/2001–05/2005

INVITED TALKS

Mathematical Life Sciences Seminar 11/24/2014

Case Western Reserve University

Effects of Moderate Noise on a Limit Cycle Oscillator: Counterrotation and Bistability

SIAM Life Sciences Minisymposium 8/6/2014

Mathematical questions in neuronal and neural network dynamics

How Precise can we Make a Biophysical Neural Integrator?

Science Colloquium 2/6/2014

Ohio Wesleyan University

Rational Analysis in Task Switching

Undergraduate Mathematics Seminar 2/6/2014

Ohio Wesleyan University

Effects of Dendritic Properties on the Firing Dynamics of Neurons

Mathematical Life Sciences Seminar 4/22/2013

Case Western Reserve University

The Effects of Dendritic Properties on the Dynamics of Oscillatory Neurons

Mathematical Biology Seminar 5/31/2011

University of California, Davis

Rational Analysis of Task Switching

Mathematical Biology Seminar 4/5/2011

New Jersey Institute of Technology

The Effects of Dendritic Properties on the Dynamics of Oscillatory Neurons

Dynamical Systems and Nonlinear Science Seminar 2/19/2010

Princeton University

The Effects of Dendritic Properties on the Dynamics of Oscillatory Neurons

	<p>Colloquium 2/15/2010 Rice University <i>The Effects of Dendritic Properties on the Dynamics of Oscillatory Neurons</i></p>
POSTER SESSIONS	<p>Nonlinear dynamics and stochastic methods: from neuroscience to other biological applications Pittsburgh, PA. 03/2014 <i>Effects of moderate noise on a limit cycle oscillator: Counterrotation and bistability</i></p> <p>Computational and Systems Neuroscience (Cosyne) 2014 Salt Lake City, UT. 02/2014 <i>How precise can we make a biophysical neural integrator?</i></p> <p>Society for Neuroscience (SfN), 41st Annual Meeting Washington, DC. 10/2011 <i>Computational Constraints on Cognitive Control</i></p> <p>SIAM Conference on the Life Sciences (LS10) Pittsburgh, PA. 07/2010 <i>Bistability in a Leaky-Integrate-and-Fire Neuron with a Passive Dendrite</i></p> <p>Conference in Honor of John Rinzel's 60th Birthday NYU, New York, NY. 06/2009 <i>Effects of Dendritic Load on the Firing Frequency of Oscillating Neurons</i></p> <p>Seventeenth Annual Computational Neuroscience Conference CNS 2008 Portland, OR. 7/2008 <i>Effects of passive dendritic properties on the dynamics of an oscillating neuron</i></p> <p>Davis SIAM Student Research Conference (DSSRC 2008) University of California, Davis, CA. 5/2008 <i>Effects of passive dendritic properties on the dynamics of an oscillating neuron</i></p> <p>Einsteins in the City City College of New York, CUNY, New York, NY. 2005 <i>Action potential dynamics in simulated and real axons</i></p> <p>Society for Neuroscience (SFN), 34th Annual Meeting San Diego, CA. 10/2004 <i>Action potential dynamics in simulated and real axons</i></p>
REFEREE SERVICE	<p><i>SIAM Journal of Applied Math, PLOS Computational Biology, PLOS ONE, Journal of Mathematical Neuroscience, Nonlinearity, Journal of Mathematical Psychology, Physical Review Letters</i></p>
CONFERENCE SERVICE	<p>Co-Organizer for minisymposium: "Understanding the Link Between Neuronal Dynamics and Neuronal Computation" SIAM Conference on the Life Sciences 2010 (LS10) Pittsburgh, PA, July, 2010.</p>
UNIVERSITY SERVICE	<p>Co-Lead Organizer Workshop for Young Researchers in Mathematical Biology (WYRMB) 2013 Mathematical Biosciences Institute, 8/2013</p>

Co-Organizer Dynamical Systems and Nonlinear Science Seminar
Princeton University, 9/2010–5/2011

SIAM Club Executive Chairman

University of California, Davis, 6/2008–6/2009

Chaired the five member executive committee for the Society of Industrial and Applied Mathematics (SIAM) club at UC Davis which promotes applied mathematics throughout the UC Davis campus and provides a forum for students interested in applied mathematics. Organized the second annual Davis SIAM Student Research Conference (DSSRC 2009). Successfully orchestrated SIAM funding grant and NSF VIGRE grant proposals to fund projects.

**WORKSHOPS
ATTENDED**

Methods in Computational Neuroscience

Marine Biological Laboratory, Woods Hole, MA

Invited participant, 08/2009

Math Biology Workshop on Building an Interdisciplinary Career

University of Utah, Salt Lake City, UT

Invited Participant, 05/2009

Computational Cell Biology

Cold Springs Harbor Laboratory, Cold Springs Harbor, NY

Invited participant, 06/2008

**PROFESSIONAL
MEMBERSHIPS**

American Mathematical Society, Society for Industrial and Applied Mathematics,
Society for Neuroscience