

Mark Goldman

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EDUCATION

- 2000 **Harvard University**, Cambridge, MA
Ph.D., Physics
Advisors: Dr. Laurence Abbott (Brandeis University)
Dr. Charles Marcus
- 1989 - 1993 **Stanford University**, Stanford, CA
B.S., Physics, with honors and distinction.

RESEARCH/TEACHING EXPERIENCE

- 2015 - **Professor**, Center for Neuroscience, Department of Neurobiology, Physiology, and Behavior, and Department of Ophthalmology and Vision Science, University of California at Davis
- 2008 - 2015 **Assistant and Associate Professor**, Center for Neuroscience, Department of Neurobiology, Physiology, and Behavior, and Department of Ophthalmology and Vision Science, University of California at Davis
- 2003 - 2007 **Assistant Professor**, Department of Physics and Program in Neuroscience, Wellesley College
- 2000 - 2003 **Postdoctoral Research Fellow**, Massachusetts Institute of Technology and Howard Hughes Medical Institute. Supervisor: Dr. Sebastian Seung

HONORS AND AWARDS

- ♦ Joel Keizer Chair in Theoretical and Computational Biology, UC Davis, 2019
- ♦ Wayne E. Crill Endowed Lecture, University of Washington, 2016
- ♦ HHMI Professor, appointed in 2014
- ♦ Outstanding Graduate Mentor in Neuroscience, UC Davis, 2011
- ♦ Sloan Fellow, Alfred P. Sloan Foundation, awarded in 2007
- ♦ Certificate of Distinction in Teaching, Harvard University, 1998
- ♦ Phi Beta Kappa, election in junior year, Stanford University, 1992
- ♦ David S. Levine Award, Stanford University, 1992
Prize given after junior year to outstanding student in physics.

OTHER INFORMATION

- ♦ Editorial Board, Action Editor, *Journal of Computational Neuroscience*, 2012-present.
- ♦ Review Editor, *Frontiers in Computational Neuroscience*, 2007-present.
- ♦ Scientific Advisory Board, International Brain Laboratory, 2018.
- ♦ Co-Director, Methods in Computational Neuroscience Course, Marine Biological Laboratory, Woods Hole, MA, 2013-2017.
- ♦ Guest Editor, *eLife*, 2014-2015.

- ◆ Study Section, NSF/NIH Collaborative Research in Computational Neuroscience, 2008, 2009, 2014.
- ◆ Board of Directors, Computational Neuroscience Organization, 2003-2007.
- ◆ Society for Neuroscience, Faculty for Undergraduate Neuroscience, and American Physical Society member.

CURRENT RESEARCH SUPPORT

- ◆ NIH R01 NS104926, 01/15/18 – 12/31/22
Project title: Circuit mechanisms underlying learned changes in persistent neural activity
Role: Co-PI (Contact PI: Aksay, Weill/Cornell Medical University)
- ◆ NIH U19 NS104648, 9/28/17 – 7/31/22
Project title: Mechanisms of neural circuit dynamics in working memory and decision-making
Role: Project lead (Contact PI: Brody, Princeton University)
- ◆ Simons Global Brain Collaboration 542989SPI, 07/01/17 – 06/30/22
Project title: Plasticity of global brain dynamics: tunable neural integration; and Neural circuit dynamics underlying sequences and variability
Role: PI
- ◆ NIH R01 EY027036, 8/1/16 – 7/31/20
Project title: Circuit mechanisms underlying persistent activity in a neural integrator
Role: Co-PI (PI: Aksay, Weill/Cornell Medical University)
- ◆ HHMI 52008137, 9/1/14 – 8/31/19
Project title: Training biologists for the 21st century: From discovery-based labs to a quantitative biology major
Role: PI

RECENT PREVIOUS RESEARCH SUPPORT

- ◆ NIH R01 EY022087, 3/1/13 – 2/28/18
Project title: The Role of Extrastriate and Parietal Cortex in the Control of Steering
Role: Consultant (PI: Britten, UC Davis)
- ◆ Simons Foundation 324260, 7/1/14 – 6/30/17
Project title: Mechanisms of Context-Dependent Neural Integration and Short-Term Memory
Role: PI
- ◆ NIH R01 EY021581, 4/1/12 – 3/31/17
Project title: The computational importance of cerebellar processing
Role: Consortium PI (PI: Aksay, Weill/Cornell Medical University)
- ◆ NIH R01 MH065034-11, 4/1/13 – 3/31/17
Project title: Cognitive Neuroscience of Attention and Working Memory in Schizophrenia
Role: Co-Investigator (PIs: Gold, University of Maryland–Baltimore; Luck, UC Davis)
- ◆ NIH R01 EY016182, 7/1/11-6/30/16
Project title: Prenatal development of visual system
Role: Consultant (PI: Usrey, UC Davis)
- ◆ NIH R01 GM105024, 4/10/13 – 4/9/16
Project title: Stochastic integrator models of collective decision-making
Role: Co-PI (PI: Gordon, Stanford University)

PUBLICATIONS AND PRESENTATIONS

Preprints:

- ♦ Chartrand T, Goldman MS, Lewis TJ (2018) Synchronization of electrically coupled resonate-and-fire neurons, *arXiv*.

Review articles and edited book chapters:

- ♦ Goldman MS (2015) Failure of averaging. In: Jaeger D, Jung R (eds.) *Encyclopedia of Computational Neuroscience* (Springer).
- ♦ Goldman MS (2013) Associate editor: Eye movements section. In: Chalupa LM, Werner JS (Editors-in-chief) *The New Visual Neurosciences* (MIT Press).
- ♦ Goldman MS, Compte A, Wang X-J (2009) Neural integrator models. In: Squire LR (ed.) *Encyclopedia of Neuroscience* (Oxford: Academic Press), volume 6, pp. 165-178.

Research articles:

- ♦ Mackevicius EL, Bahle AH, Williams AH, Gu S, Denissenko NI, Goldman MS [*co-corresponding author*], Fee MS (2019) Unsupervised discovery of temporal sequences in high-dimensional datasets, with applications to neuroscience, *eLife* 8:e38471.
- ♦ Lankow BS, Goldman MS (2018) Competing inhibition-stabilized networks in sensory and memory processing, *2018 52nd Asilomar Conference on Signals, Systems, and Computers*, pp. 97-103.
- ♦ Sylvester SJG, Lee MM, Ramirez A, Lim S, Goldman MS [*co-corresponding author*], Aksay ERF (2017), Population-scale organization of cerebellar granule neuron signaling during a visuomotor behavior, *Scientific Reports* 7:16240.
- ♦ Goldman MS, Fee MS (2017) Computational training for the next generation of neuroscientists, *Current Opinion in Neurobiology* 46:25-30.
- ♦ Jacobson JD, Arauco-Aliaga RP, Crow S, Gordon DM, Goldman MS (2016) Effect of interactions between harvester ants on forager decisions, *Frontiers in Ecology and Evolution* 4:115.
- ♦ Daie K, Goldman MS [*co-corresponding author*], Aksay ERF (2015) Spatial patterns of persistent neural activity vary with the behavioral context of short-term memory, *Neuron* 85:847-860. [*Featured with an accompanying Preview article*]
- ♦ Lim S, Goldman MS (2014) Balanced cortical microcircuitry for spatial working memory based on corrective feedback control, *Journal of Neuroscience* 34:6790-6806.
- ♦ Fisher D, Olasagasti I, Tank DW, Aksay E, Goldman MS (2013) A modeling framework for deriving the structural and functional architecture of a short-term memory microcircuit, *Neuron* 79:987-1000.
- ♦ Lim S, Goldman MS (2013) Balanced cortical microcircuitry for maintaining information in working memory, *Nature Neuroscience* 16:1306-1314.
- ♦ Sanders H, Berends M, Major G, Goldman MS [*co-corresponding author*], Lisman JE (2013) NMDA and GABAB (Kir) conductances: the “perfect couple” for bistability, *Journal of Neuroscience* 33:424-429.
- ♦ Lim S, Goldman MS (2012) Noise tolerance of attractor and feedforward memory models, *Neural Computation* 24:332-390.
- ♦ Goldman MS (2009) Memory without feedback in a neural network, *Neuron* 61:621-634. [*Featured with an accompanying Preview article*]
- ♦ Aksay E, Olasagasti I, Mensh BD, Baker R, Goldman MS [*co-corresponding author*], Tank DW (2007) Functional dissection of circuitry in a neural integrator, *Nature Neuroscience* 10:494-504.

- ◆ Butts DA, Goldman MS (2006) Tuning curves, neuronal variability, and sensory coding, *PLoS Biology* 4:e92. [Featured article in April 2006 issue]
- ◆ Goldman MS (2004) Enhancement of information transmission efficiency by synaptic failures, *Neural Computation* 16:1137-1162.
- ◆ Goldman MS, Levine JH, Major G, Tank DW, Seung HS (2003) Robust persistent neural activity in a model integrator with multiple hysteretic dendrites per neuron, *Cerebral Cortex* 13:1185-1195.
- ◆ Aksay E, Major G, Goldman MS, Baker R, Seung HS, Tank DW (2003) History dependence of rate covariation between neurons during persistent activity in an oculomotor integrator, *Cerebral Cortex* 13:1173-1184.
- ◆ Goldman MS, Kaneko CRS, Major G, Aksay E, Tank DW, Seung HS (2002) Linear regression of eye velocity on eye position and head velocity suggests a common oculomotor neural integrator, *Journal of Neurophysiology* 88:659-665.
- ◆ Golowasch J, Goldman MS, Abbott LF, Marder E (2002) Failure of averaging in the construction of a conductance-based neuron model, *Journal of Neurophysiology* 87:1129-1131.
- ◆ Goldman MS, Maldonado P, Abbott LF (2002) Redundancy reduction and sustained firing with stochastic depressing synapses, *Journal of Neuroscience* 22:584-591.
- ◆ Goldman MS, Golowasch J, Marder E, Abbott LF (2001) Global structure, robustness, and modulation of neuronal models, *Journal of Neuroscience* 21:5229-5238.
- ◆ Goldman MS (2000) Computational implications of activity-dependent neuronal processes, Harvard Univ. Ph.D. thesis.
- ◆ Goldman MS, Golowasch J, Marder E, Abbott LF (2000) Dependence of firing pattern on intrinsic ionic conductances: sensitive and insensitive combinations, *Neurocomputing* 32-33:141-146.
- ◆ Goldman MS, Nelson SB, Abbott LF (1999) Decorrelation of spike trains by synaptic depression, *Neurocomputing* 26-27:147-153.

Recent Abstracts (2008-present):

- ◆ Bhasin J, Goldman MS (2018) Systems consolidation without replay? Learning rules and circuit architectures for consolidation in cerebellar learning, *Society for Neuroscience Abstracts* 490.09.
- ◆ Alemi A, Goldman MS (2018) An adaptive control theory for cerebellar mediated tuning of the oculomotor neural integrator, *Society for Neuroscience Abstracts* 490.15
- ◆ Goldman MS, Allen KR (2015) Context-dependent filtering as an emergent property of high dimensional networks, *Society for Neuroscience Abstracts* 95.25.
- ◆ Chartrand T, Goldman MS, Lewis TJ (2015) Network oscillations of inferior olive neurons: entrainment and phase-locking of locally coupled oscillators, *Bulletin of the American Physical Society* 60:P1.100.
- ◆ Wright TM, Goldman MS, Mulloney B (2014) Modeling encoding in identified coordinating neurons, *Society for Neuroscience Abstracts* 65.08.
- ◆ Payne HL, Goldman MS, Raymond JL (2013) Cerebellar Purkinje cells exhibit rapid plasticity during motor learning, *Society for Neuroscience Abstracts* 164.11.
- ◆ Wright TM, Schneider AC, Goldman MS, Mulloney B (2013) Modeling the input-output relationship of identified coordinating neurons, *Society for Neuroscience Abstracts* 372.13.
- ◆ Daie KP, Goldman M, Aksay E (2013) Context-dependent spatial patterns of persistent firing for multitasking, *Society for Neuroscience Abstracts* 485.08.

- ◆ Sylvester SK, Lee M, Lim S, Daie K, Goldman M, Aksay E (2013) The signaling properties of cerebellar granule cells during optokinetic tracking, *Society for Neuroscience Abstracts* 647.14.
- ◆ Zhao GQ, Chen AI, Suvrathan A, Bonanno L, Nguyen-Vu BTD, Chartrand T, Goldman MS, Reichardt LF, Raymond JL (2013) Selective contribution of local inhibition to cerebellar timing, *Society for Neuroscience Abstracts* 647.18.
- ◆ Lim S, Goldman M (2012) Balanced cortical microcircuitry for spatial working memory based on corrective feedback control, *Society for Neuroscience Abstracts* 706.17.
- ◆ Lim S, Goldman M (2011) A model short-term memory network based on negative-feedback control, *Society for Neuroscience Abstracts* 624.07.
- ◆ Miri JA, Daie K, Fisher D, Goldman MS, Aksay E, Tank DW (2011) Inferring the circuit architecture of a neural integrator from cellular calcium-sensitive fluorescence dynamics, *Society for Neuroscience Abstracts* 624.23.
- ◆ Fisher D, Conway B, Goldman M (2009) Color sensitivity and color constancy of single-opponent and double-opponent cells to natural images, *Society for Neuroscience Abstracts* 756.18.
- ◆ Berends MR, Major G, Goldman MS (2009) Roles of inward and outward currents in producing membrane bistability, *Society for Neuroscience Abstracts* 323.16.
- ◆ Lee MM, Aksay E, Goldman MS (2008) Temporal integration in a network of conductance-based model neurons with dendritic bistability, *Society for Neuroscience Abstracts* 89.22.

Recent Refereed Conference Presentations (2008-present):

- ◆ Gill J, Allen K, Williams AH, Goldman MS, High-dimensional filtering supports context-dependent neural integration, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Lisbon, Portugal, 2019.
- ◆ Chartrand T, Goldman MS, Lewis TJ, Spatial patterns of synchrony from electrical synapses in the inferior olive, poster given at Computational Neuroscience Meeting, Seattle, WA, 2018.
- ◆ Bhasin J, Goldman MS, Raymond J, Systems consolidation without replay? Learning rules and circuit architectures for consolidation in cerebella learning presentation, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Denver, CO, 2018.
- ◆ Mackevicius EL, Bahle AH, Williams AH, Gu S, Denissenko NI, Goldman MS, Fee MS Unsupervised discovery of neural sequences in large-scale recordings, talk given at Computational and Systems Neuroscience Conference (Cosyne), Denver, CO, 2018.
- ◆ Chartrand T, Goldman MS, Lewis TJ, Synchronization of electrically coupled resonate-and-fire neurons, poster given at SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, 2017.
- ◆ Chartrand T, Goldman MS, Lewis TJ, Synchronization of spiking and subthreshold states in electrically coupled neuronal networks, talk given at SIAM Conference on Life Sciences, Boston, MA, 2016.
- ◆ Payne HL, Raymond JL, Goldman MS, Interactions between circuit architecture and plasticity in a closed-loop system, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2016.
- ◆ Chartrand T, Goldman MS, Lewis TJ, Synchronization of spiking and subthreshold states in electrically coupled networks of neurons, poster given at Dynamics Days US, Durham, NC, 2016.
- ◆ Chartrand T, Goldman MS, Lewis TJ, Network Oscillations of Inferior Olive Neurons: Entrainment and Phase-Locking of Locally-Coupled Oscillators, poster given at SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, 2015.

- ◆ Lim S, Goldman MS, Balanced cortical microcircuitry for spatial working memory based on corrective feedback control, talk given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2014.
- ◆ Chartrand T, Zhao GQ, Raymond JL, Goldman MS, Contribution of cerebellar Golgi cells to learned motor timing during the vestibulo-ocular reflex, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2014.
- ◆ Lim S, Goldman MS, Balanced cortical microcircuitry for maintaining short-term memory, talk given at Computational Neuroscience (CNS) meeting, Atlanta, GA, 2012.
- ◆ Lim S, Goldman MS, Short-term memory with balanced excitation and inhibition based on derivative feedback control, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2012.
- ◆ Daie K, Goldman MS, Aksay E, Functional Connectivity of the Neural Integrator in Larval Zebrafish, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2012.
- ◆ Lee MM, Daie K, Sylvester S, Fisher D, Goldman MS, Aksay E, Dendritic processing underlying temporal integration, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2012.
- ◆ Sylvester S, Daie K, Lee MM, Goldman MS, Aksay E, Cerebellar granule cell activity during behavior: dynamics in light of the adaptive filter model, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2012.
- ◆ Lim S, Goldman MS, Noise tolerance of attractor and feedforward memory models, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2011
- ◆ Fisher D, Aksay E, Goldman MS, Anatomical and functional connectivity of an identified short-term memory network, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2011.
- ◆ Lim S, Goldman MS, Optimal network architectures for short-term memory under different biological settings, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2010.
- ◆ Fisher D, Aksay E, Goldman MS, Sparse connectivity in short-term memory networks, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2010.
- ◆ Fisher D, Conway BR, Goldman MS, Color constancy of V1 double opponent cells to natural images, poster given at Computational and Systems Neuroscience (Cosyne) Meeting, Salt Lake City, UT, 2009.
- ◆ Maynard SM*, Conway BR, Goldman MS, Modeling the transformation from LGN to V1 color-opponent receptive fields, poster given at Computational Neuroscience Meeting, Portland, OR, 2008.
- ◆ Goldman MS, Tochiki K*, Schnobrich C*, Tse S*, Tank DW, Major G, Dependence of dendritic plateau potential duration and amplitude on form and location of synaptic input, poster given at Computational and Systems Neuroscience Meeting, Salt Lake City, UT, 2008.
- ◆ Lee M, Levine JH*, Bomash I, Molinelli E, Aksay E, Goldman MS, Temporal integration in a network of conductance-based model neurons with dendritic bistability, poster given at Computational and Systems Neuroscience Meeting, Salt Lake City, UT, 2008.

Recent Invited Talks (2008-present):

- ◆ Microcircuits for short-term memory storage, motor control, and neural integration, GT Neuro seminar series, Georgia Institute of Technology, Atlanta, GA, 2019

- ◆ Microcircuits for short-term memory storage, motor control, and neural integration, Complex Systems in Neuroscience: Bridging Theory and Experiment Conference, Pittsburgh, PA, 2018.
- ◆ Microcircuits for short-term memory storage, motor control, and neural integration, Department of Physiology and Biophysics, University of Colorado Anschutz Medical Campus, Denver, CO, 2017.
- ◆ Linear network theory and Neural integrators, lectures given at Methods in Computational Neuroscience Course, Marine Biological Laboratory, Woods Hole, MA, 2017.
- ◆ Linear network theory, Sloppy models, and Adaptive filter models, lectures given at Berkeley Mining and Modeling of Neuroscience Data course, Redwood Center for Theoretical Neuroscience, UC Berkeley, Berkeley, CA, 2017.
- ◆ Linear network theory and sloppy models, Computational neuroscience tutorials series, Department of Brain & Cognitive Sciences, MIT, Cambridge, MA, 2016.
- ◆ Linear network theory and Neural integrators, lectures given at Methods in Computational Neuroscience Course, Marine Biological Laboratory, Woods Hole, MA, 2016.
- ◆ Microcircuits for short-term memory storage and neural integration, Wayne E. Crill endowed lecture, Department of Physiology and Biophysics, University of Washington, Seattle, WA, 2016.
- ◆ Neural circuit motifs for short-term memory and integration, European Research Council workshop on Biological Control Across Scales, Sidney Sussex College, University of Cambridge, Cambridge, England, 2016.
- ◆ Neural circuit mechanisms of short-term memory, American Physical Society March Meeting, Baltimore, MD, 2016.
- ◆ Microcircuits for memory storage and neural integration, Computational and Systems Neuroscience Conference (Cosyne), Salt Lake City, UT, 2016.
- ◆ Microcircuits for short-term memory storage and neural integration, Sloan-Swartz Center for Theoretical Neurobiology, California Institute of Technology, Pasadena, CA, 2016.
- ◆ Microcircuits for short-term memory and neural integration, Keynote speaker, Theoretical and Computational Neuroscience Conference, Gulf Coast Consortium for Theoretical and Computational Neuroscience, Houston, TX, 2016.
- ◆ How neurons do integrals, RECOMB Satellite Conference on Bioinformatics Education and HHMI Constellation Studio on Big Data, MOOCs, and Quantitative Education for Biologists, Howard Hughes Medical Institute, Chevy Chase, MD, 2015.
- ◆ The challenging of constructing a robust short-term memory network, Theory of Neural Computation Workshop, Mathematical Sciences Research Institute, Berkeley, CA, 2015.
- ◆ Cellular and circuit mechanisms underlying persistent activity in a neural integrator, Collaborative Research in Computational Neuroscience PI Meeting, University of Washington, Seattle, WA, 2015.
- ◆ Microcircuits for short-term memory storage and neural integration, Neuroscience and Cognitive Science Program seminar series, University of Maryland, College Park, MD, 2015.
- ◆ Context-dependent accumulation of signals in short-term memory circuits, Simons Foundation Collaboration on the Global Brain meeting, New York, NY, 2015.
- ◆ Linear network theory and Neural integrators, lectures given at Methods in Computational Neuroscience Course, Marine Biological Laboratory, Woods Hole, MA, 2015.
- ◆ Microcircuits for short-term memory storage and neural integration, Berkeley Course in Mining and Modeling of Neuroscience data, Redwood Center for Theoretical Neuroscience, Berkeley, CA, 2015.
- ◆ Inferring the features of network connectivity governing the dynamics of a brain memory circuit, Statistical Sciences Symposium, UC Davis, Davis, CA, 2015.

- ◆ Microcircuits for short-term memory storage and neural integration, Swartz seminar series, New York University, New York, NY, 2014.
- ◆ Linear network theory and Neural integrators, lectures given at Methods in Computational Neuroscience Course, Marine Biological Laboratory, Woods Hole, MA, 2014.
- ◆ Microcircuits for short-term memory storage and neural integration, McGovern Institute, Massachusetts Institute of Technology, Cambridge, MA, 2014.
- ◆ Training biologists for the 21st century: from discovery-based labs to a quantitative biology major, Howard Hughes Medical Institute, Chevy Chase, MD, 2014.
- ◆ Microcircuits for short-term memory storage and neural integration, Center for Mind, Brain, and Computation, Stanford University, Stanford, CA, 2014.
- ◆ Microcircuits for short-term memory storage and neural integration, Center for Theoretical Neuroscience, Columbia University, New York, NY, 2014.
- ◆ Neural integrators: theory and robustness, lectures given at Methods in Computational Neuroscience Course, Marine Biological Laboratory, Woods Hole, MA, 2013
- ◆ Microcircuits for short-term memory storage and neural integration, Sloan-Swartz Meeting for Computational Neuroscience, Brandeis University, Waltham, MA, 2013.
- ◆ Microcircuits for short-term memory storage and neural integration, Federation of European Neuroscience Society (FENS) Conference “Dynamics of memory: What is the evidence?” Barcelona, Spain, 2012.
- ◆ Microcircuits for short-term memory storage and neural integration, Symposium on Dynamics of Neural Microcircuits, UCLA, Los Angeles, CA, 2012.
- ◆ Microcircuits for short-term memory storage and neural integration, Yale University, Swartz Program in Theoretical Neurobiology seminar series, New Haven, CT, 2012.
- ◆ A short-term memory circuit, from single neurons to behavior, Symposium on Brains, Mind, and Models, City University of New York Graduate Center, New York, NY, 2011.
- ◆ Neural integrators: theory and robustness, lectures given at Methods in Computational Neuroscience Course, Marine Biological Laboratory, Woods Hole, MA, 2011.
- ◆ Bridging single-neuron measurements and network function, KITP mini-program on Network Architecture of Brain Structure and Function, Kavli Institute of Theoretical Physics, Santa Barbara, CA, 2011.
- ◆ Modeling mechanisms of short-term memory, lecture given at Biology of Memory Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 2011.
- ◆ Neural circuit mechanisms underlying short-term memory, Berkeley Course in Mining and Modeling of Neuroscience data, Redwood Center for Theoretical Neuroscience, Berkeley, CA, 2011.
- ◆ Neural circuit mechanisms underlying short-term memory, Howard Hughes Medical Institute (Janelia Farm Research Campus), Ashburn, VA, 2011.
- ◆ Modeling the neural mechanisms underlying short-term memory, Stanford University, Frontiers in Quantitative Biology seminar series, Stanford, CA, 2011.
- ◆ Network architectures for short-term memory storage and neural integration, Stanford University Center for Mind, Brain, and Computation, Stanford, CA, 2010.
- ◆ Neural integrators: theory and robustness, lectures given at Methods in Computational Neuroscience Course, Marine Biological Laboratory, Woods Hole, MA, 2010.
- ◆ Robust memories, brittle models: challenges in modeling neural activity in short-term memory networks, Opportunities at the Interface of Physics and Biology meeting (sponsors: Burroughs Wellcome Fund, W.M. Keck Foundation, The Swartz Foundation), Chicago, IL, 2010.
- ◆ Network models of short-term memory, persistent neural activity, and neural integration, the Computational Neuroscience Meeting, San Antonio, TX, 2010.

- ◆ Modeling the mechanisms underlying memory-related neural activity, UC Irvine, Irvine, CA 2010.
- ◆ Network structures underlying persistent activity and neural integration, Computational and Systems Neuroscience (Cosyne), Meeting Workshop on Persistent Neural Activity, Snowbird, UT, 2010.
- ◆ Modeling the mechanisms underlying memory-related neural activity, University of Houston, Houston, TX, 2010.
- ◆ Modeling the mechanisms underlying memory-related neural activity, University of Texas Medical School, Houston, TX, 2010.
- ◆ Neural integrators: theory and robustness, lectures given at Methods in Computational Neuroscience Course, Marine Biological Laboratory, Woods Hole, MA, 2009.
- ◆ Modeling mechanisms of short-term memory, lecture given at Biology of Memory Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 2009.
- ◆ Modeling the mechanisms underlying memory-related neural activity, Howard Hughes Medical Institute - Janelia Research Campus, Ashburn, VA, 2009.
- ◆ Modeling the mechanisms underlying memory-related neural activity, University of Washington, 2009.
- ◆ Neural integrators: theory, lectures given at Methods in Computational Neuroscience Course, Marine Biological Laboratory, Woods Hole, MA, 2008.
- ◆ Modeling the mechanisms underlying memory-related neural activity, Redwood Center for Theoretical Neuroscience, UC Berkeley, Berkeley, 2008.
- ◆ Memory without feedback or attractors in a neural network, Weill Medical College of Cornell University, New York City, NY, 2008.
- ◆ Modeling the mechanisms underlying memory-related neural activity, Waterloo University, Waterloo, Canada, 2008.