LEONID L. RUBCHINSKY

Curriculum Vitae

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ADDRESS

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EDUCATION

Degrees

Ph.D., Physics (nonlinear dynamics)	Institute for Applied Physics, Russian Academy of Sciences, Nizhny Novgorod, Russia, 2000 (advisors: M.I. Rabinovich and M.M. Sushchik Sr.)
M.S., Physics	University of California, San Diego, 1997
B.S., Physics	University of Nizhny Novgorod, Russia, 1995

Non-degree training

Workshop on Dynamics of Neural Networks: From Biophysics to Behavior.	University of California, Santa Barbara, 2001
Workshop on Dynamical Systems	International Center for Theoretical Physics, Italy, 1998

ACADEMIC APPOINTMENTS

2010 –	Associate professor
2004 – 2010	Assistant professor Department of Mathematical Sciences, Indiana University – Purdue University Indianapolis, and Stark Neurosciences Research Institute, Indiana University School of Medicine
2001 – 2004	Postdoctoral Research Fellow, University of California, Davis (postdoctoral mentors: K.A. Sigvardt and N. Kopell)
1997 – 2001	Junior Research Associate Institute for Applied Physics, Russian Academy of Science
1999 – 2000	Lecturer University of Nizhny Novgorod, Nizhny Novgorod, Russia
1995 – 1997	Research Assistant, Teaching Assistant University of California, San Diego
1994 – 1995	Research Assistant Institute for Applied Physics, Russian Academy of Science

OTHER PROFESSIONAL EXPERIENCE

2003 – 2004 Consulting Electrophysiologist for Functional Neurosurgery
Kaiser Permanente Medical Group, Sacramento, CA

RESEARCH INTERESTS

Applied dynamical systems, biomathematics, computational neuroscience:
dynamics of coupled oscillators, synchronization, oscillations,
neuronal assemblies, neurodynamics, information processing in neural networks
physiology of basal ganglia and parkinson's disease:
physiology of cortical networks in addiction

AWARDS AND FELLOWSHIPS

- IUPUI Athletics Favorite Professor Award (2006, 2010)
- Open Society Institute (Moscow, Russia) Grant (2000)
- Razuvaev Fellowship of Nizhny Novgorod Region Administration (1998, 1999)
- Soros International Science Educational Program Fellowships (1995, 1998-2000)
- The Russian Presidential Fellowship (1995)

FUNDING

- IU Overseas Conference Grant, project role: PI, 2017.
- Indiana Clinical and Translational Sciences Institute grant “Closed-Loop Adaptive Deep Brain Stimulation for Parkinson’s disease”, project role: PI, 2014-2017.
- Purdue Research Foundation International Travel Grant, project role: PI, 2015.
- IU Collborative Research Grant “Relating electrophysiology and symptoms of Parkinson’s disease”, role on the project: PI, 2013-2014.
- NIH/NINDS R01NS067200 “Dynamics and mechanisms of rhythmic activity in basal ganglia” (part of NSF/NIH Collaborative Research in Computational Neuroscience), project role: PI, 2009-2013.
- IUPUI Institute of Mathematical Modeling and Computational Sciences Grant to Enhance Interdisciplinary Research and Education (iM2CS-GEIRE) “Transient neurodynamics of behavioral sensitization”, role on the project: PI, 2012-2013.
- Purdue Research Foundation International Travel Grant, project role: PI, 2013.
- Indiana University Research Support Funds Grant “Dynamics of cortico-subcortical oscillations in Parkinson’s disease”, project role: PI, 2012-2013.
- Indiana University Research Support Funds Grant “Activity of Basal Ganglia Networks in Parkinson’s disease: laying the foundation for adaptive brain stimulation”, project role: PI, 2007-2008.
- Purdue Research Foundation “Mathematical modeling of tremor dynamics in Parkinson’s disease”, project role: PI, 2006.

PROFESSIONAL ACTIVITIES AND SERVICE TO RESEARCH COMMUNITY

Proposal review panelist

- Panelist for Collaborative Research in Computational Neuroscience (National Science Foundation/National Institutes of Health/German Federal Ministry for Education and Research)
- Panelist for EU Joint Programme – Neurodegenerative Disease Research
- Grant Reviewer for Medical Research Council, UK
- Grant reviewer for Natural Sciences and Engineering Research Council of Canada
- Review Board Member for Bernstein Award for Computational Neuroscience of the German Federal Ministry of Education and Research (BMBF)
- Grant reviewer for Oak Ridge Associated Universities
- Grant reviewer for Neurological Foundation of New Zealand

Editorial Boards

- Frontiers in Computational Physics, Associate Editor

Professional society service

- Organization for Computational Neuroscience Board of Directors member (2017-2019).
- Annual Computational Neuroscience Meeting Program Committee member (2012, 2013, and 2014 meetings).
- Organizer of Student Poster Award Competition at the Annual Computational Neuroscience Meeting (2012-2014)
- Reviewer for the Annual Computational Neuroscience Meeting

Organization of Professional Meetings

- Co-organizer of “Computational and Systems Neuroscience: from theory to clinical applications” interdisciplinary meeting, planned to take place in Indianapolis, April 2018.
- Co-organizer of “Mathematical Modeling Basal Ganglia”, minisymposium at the SIAM conference on application of dynamical systems, Snowbird, UT, May 2015.
- Co-organizer of “Dynamics of Basal Ganglia in Brain Disorders”, minisymposium at the SIAM conference on application of dynamical systems, Snowbird, UT, May 2013.
- Co-organizer of “Neuronal and network dynamics in basal ganglia”, minisymposium at the SIAM conference on application of dynamical systems, Snowbird, UT, May 2011.
- Co-organizer of “Phase locking in the presence of biological noise”, workshop at the 19th Annual Computational Neuroscience Meeting CNS*2010, San Antonio, TX, July 2010.
- Co-organizer of “Basal Ganglia dynamics vs. Basal Ganglia function and dysfunction”, workshop at the 17th Annual Computational Neuroscience Meeting CNS*2008, Portland, Oregon, July 2008.
- Co-organizer of “Theoretical approaches to basal ganglia function”, two-day mini-symposium at the 13th Annual Computational Neuroscience Meeting CNS*2004, Baltimore, July 2004.

Manuscript reviewer

- Biological Cybernetics
- BioSystems
- Brain Research
- Cerebral Cortex
- Chaos
- Clinical Neurophysiology
- Computers in Biology and Medicine
- European Journal of Neuroscience
- Europhysics Letters
- Frontiers in Neuroscience
- IEEE Transactions on Circuits and Systems
- IEEE Transactions on Biomedical Engineering
- Journal of Computational Neuroscience
- Journal of Neural Engineering
- Journal of Neurophysiology
- Journal of Physiology
- Journal of Theoretical Biology
- Mathematical Biosciences
- Neural Networks
- Neuroscience and Biobehavioral Reviews
- Nonlinear Dynamics
- Physical Review E
- Physical Review Letters
- Physics Letters A
- Physiological Measurement
- PLOS Computational Biology
- PLOS ONE
- Science Translational Medicine
- Scholarpedia
- Book reviewer for Taylor and Francis
- Book reviewer for Pearson
- Book reviewer for Wiley

Affiliation with Centers and Institutes

- Stark Neurosciences Research Institute, Indiana University School of Medicine, Primary Investigator (2004-)
- Biocomplexity Institute, Indiana University, Bloomington, Affiliated Researcher (2004-)
- Center for Mathematical Biosciences, Indiana University Purdue University Indianapolis, Affiliate (2007-)
- Member of the IUPUI Institute for Mathematical Modeling and Computational Science (2012-)

- Indiana University Network Science Institute, Affiliated Faculty (2014-)

Professional society membership

- Society for Neuroscience
- Organization for Computational Neuroscience

PROFESSIONAL ACTIVITIES AND SERVICE AT HOME INSTITUTIONS

University Service

- Reviewer for Indiana University Collaborative Research Grants Program (2015-)
- Reviewer for Brain Research Foundation pre-proposals (2015-2016)
- Neuroscience Undergraduate Program Advisory Committee member (2014-)
- Indiana University Review Committee for NSF pre-proposals (2013)
- Indiana University Vice President for Research Advisory Board member (2012-)
- Steering Committee member of the Institute for Mathematical Modeling and Computational Science (2012-)
- School of Science Dean's Advisory Council retreat (Indiana University Purdue University Indianapolis, 2006)
- Young Scientists Council (Institute for Applied physics, Russian Academy of Science, 2000-2001)

Seminar organization

- Organizer of a seminar series in mathematical neuroscience (Indiana University Purdue University Indianapolis), 2004 - present.

Department Service

- Member of the departmental Advisory Committee (2012-2016)
- Chair of the departmental Colloquium Committee (2015-), member of the committee (2005-2006, 2007-2011, 2014-)
- Member of the departmental hiring committee (2010-2011,2015-2016)
- Departmental initiative to improve applied mathematics programs (2010)
- Member of the departmental Graduate Committee (2007-2011, 2013-2015, 2017-)
- Member of the departmental Undergraduate Committee (2006-2007, 2011-2012, 2016-2017)
- Member of the departmental Technology Committee (2011-2012)
- Member of the departmental High School Mathematics Contest Committee (2004-2007)
- Developed mathematical and computational neuroscience part of the proposal for the Center for Mathematical Biosciences – Signature Center at IUPUI. The proposal was supported in January 2007.

TEACHING AND MENTORING EXPERIENCE

Teaching, advising and curriculum development

2004- IUPUI and Indiana University

- Teaching:
  - Calculus for technology
  - Calculus for life sciences
  - Calculus and Analytical Geometry
  - Vector calculus
  - Integrative Neurophysiology (medical neuroscience graduate program)
  - Introduction to Biomathematics
  - Multivariate Calculus
  - Windows on Science

- Courses and Programs development:
  - Calculus for life Sciences. Undergraduate course
  - Integrative Neurophysiology. Graduate course
  - Introduction to Biomathematics. Graduate course
  - Computational Neuroscience. Undergraduate course
  - Neuroscience BS program

- Course coordination:
  - Calculus for life sciences

- Faculty member:
  - Mathematical Sciences,
    Indiana University Purdue University Indianapolis
  - Medical Neuroscience graduate program
    Indiana University School of Medicine
  - Graduate studies at Biocomplexity, Indiana University

- Advising:
  - Faculty advisor to applied mathematics majors

2003-2004 University of California, Davis

- Supervised student research assistants

1999-2000 University of Nizhny Novgorod, Nizhny Novgorod, Russia

- Taught an introductory course on mathematical modeling of neural systems dynamics for graduate students

1996-1997 University of California, San Diego

- Teaching assistant

Students and postdoctoral fellows mentored

- Shivakeshavan Ratnadurai-Giridharan, PhD (postdoctoral mentor, 2014-2016)
- Sungwoo Ahn, PhD (postdoctoral mentor, 2010-2014)
- Choongseok Park, PhD (postdoctoral mentor, 2007-2011)
- Andrey Dovzhenok, PhD (PhD advisor, 2008-2012)
- Joel Zirkle (PhD advisor, 2016-)
- Chung Cheung (PhD co-advisor, 2014-)
- Simone Cassani, PhD (PhD committee member, 2014-2016)
- Yeonjoo Yoo, PhD (PhD committee member, 2014-2016)
- Abolhassan Behrouzvaziri (PhD committee member, 2014-)
- Daniele Prada, PhD (PhD committee member, 2015)
- Alex Duncan (MS committee member, 2016-2017)
- Brant Coburn (MS committee member, 2017-)
- Jessica Solfest (REU mentor, 2012)
- Abhishek Ray, MD (REU mentor, 2003-2004)

REU mentoring

- Mentor at Undergraduate Summer Research Program at the Mathematical Biosciences Institute at Ohio State University.

Other mentoring

- Postdoc Mentor at the Mathematical Biosciences Institute at Ohio State University.
- Mentor for Dr. C. Park (North Carolina A&T State University) on a Historically Black Colleges and Universities – Undergraduate Program NSF award

INVITED OR COMPETITIVE TALKS AND PRESENTATIONS

- "Optogenetic vs. electrical stimulation of synchronized oscillations in a computational model of parkinsonian basal ganglia." Control and Modulation of Neuronal and Motor Systems Workshop, Mathematical Biosciences Institute, Columbus, OH (September 2017).
- "Temporal patterns on neural synchrony: observations, mechanisms, and functions." Neuronal Oscillations: mechanisms and functionality Workshop at the 26th Annual Computational Neuroscience Meeting CNS*2017, Antwerp, Belgium (July 2017).
- "Temporal patterns of intermittent neural synchronization." International Workshop "Brain Dynamics on Multiple Scales - Paradigms, their Relations, and Integrated Approaches". Max Planck Institute for the Physics of Complex Systems, Dresden, Germany (June 2017).
- "Synchronization in neuroscience". IUPUI Neuro Club, Indianapolis, IN (December 2016).
- "Temporal patterns of intermittent neural synchronization". Dynamical Systems and Data Analysis in Neuroscience: Bridging the Gap Workshop, Mathematical Biosciences Institute, Columbus, OH (October 2016).
- "Properties, mechanisms, and potential functions of intermittent neural synchronization." Dynamical Principles in Neural Circuits Workshop at the 25th Annual Computational Neuroscience Meeting CNS*2016, Jeju, South Korea (July 2016).
- "Dynamics of intermittent synchronization: from theory to neuroscience applications". Applied Mathematics Seminar, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, Notre Dame, IN (May 2016).
- "Dynamics of intermittent synchronization: from theory to neuroscience applications". Physics Colloquium, Physics Department, IUPUI (January 2016).
- "Dynamics of Intermittent Synchronization". Department of Mathematics, North Carolina A&T State University (May 2015).
- **"**Cortical impact on the dynamics of subthalamo-pallidal networks." Mathematical Modeling of Basal Ganglia minisymposium at the SIAM conference on application of dynamical systems, Snowbird, UT (May 2015).
- "Fine temporal structure of intermittent synchronization: from theory to neuroscience applications." Mathematics + Computation + Science = Solutions (iMCSS Symposium), Indianapolis, IN (September 2014).
- "Fine temporal structure of neural synchronization: Parkinson's disease, addiction, etc." Mathematical and Computational Cognitive Sciences Colloquium, Purdue University (February 2014).
- "Fine temporal structure of intermittent synchronization: detection, mechanisms, and applications in neuroscience." Mathematical Modeling and Computational Sciences Seminar, IUPUI (November 2013).
- **"**Dynamical circuits coupling between basal ganglia and cerebral cortex." Dynamics of Basal Ganglia in Brain Disorders minisymposium at the SIAM conference on application of dynamical systems, Snowbird, UT (May 2013).
- "Intermittent neural synchronization in basal ganglia in Parkinson's disease". BME Seminar at Johns Hopkins University, Baltimore, MD (March 2013).

- "Synchronized oscillatory dynamics of cortico-basal ganglia networks in Parkinson's disease". Disease Workshop. Mathematical Biosciences Institute, Columbus, OH (February 2013).
- "Fine Temporal Structure of Intermittent Synchrony". Indianapolis chapter of the Society for Neuroscience Annual Meeting, Indiana University, Indianapolis (September 2012).
- "Partially synchronous parkinsonian basal ganglia and delayed feedback deep brain stimulation". Focus Program "Towards Mathematical Modeling of Neurological Disease from Cellular Perspectives". Fields Institute, Toronto, ON, Canada (May 2012).
- **"**Intermittent Synchronization of Basal Ganglia Activity." Neuronal and network dynamics in basal ganglia minisymposium at the SIAM conference on application of dynamical systems, Snowbird, UT (May 2011).
- "Intermittent Neural Synchronization in Parkinson's Disease: Detection and Modeling", Complex Biological Systems Group Themes Days, University of Pittsburgh, PA, (May 2011).
- "Oscillations, Synchronization, Basal ganglia, and Parkinson's disease". Department of Mathematics, Drexel University, Philadelphia, PA, (April 2011).
- "Intermittent neural synchronization in Parkinson's disease: experimental observations and mathematical models." Applied Dynamical Systems: dynamics and networks and computational neuroscience, 2010 Hot Topics Workshop of Korean National Institute for Mathematical Sciences, Daejeon, Korea (December 2010).
- "Analysis of the fine temporal structure of synchronization of neural oscillations. Examples from parkinsonian basal ganglia." Phase Locking in the Presence of Biological Noise Workshop at the 19th Annual Computational Neuroscience Meeting CNS*2010, San Antonio, TX (July 2010).
- "Fine temporal structure of beta-band synchronization in Parkinson's disease: experiments, models and mechanisms." 19th Annual Computational Neuroscience Meeting CNS*2010, San Antonio, TX (July 2010).
- "Synchronization in Basal Ganglia Networks in Parkinson's disease." Indiana University Bloomington – Indiana University Purdue University Indianapolis 2008 Neuroscience Retreat, Bradford Woods, IUB (October 2008).
- "Variability of basal ganglia oscillations and its possible relation to function." Basal Ganglia dynamics vs. Basal Ganglia function and dysfunction, Workshop at the 17th Annual Computational Neuroscience Meeting CNS*2008, Portland, Oregon (July 2008).
- "Synchronization of local filed potentials and neuronal units oscillations in parkinsonian subthalamic nucleus." Real Time Brain Interfacing Applications Workshop, Mathematical Biosciences Institute, Ohio State University, Columbus, OH (May 2008).
- "Dynamics of Basal Ganglia Networks in Parkinson's Disease: Models and Experiments." Workshop on Interdisciplinary Biomedical Research, University of Notre Dame, IN (April 2008).
- "Synchronization in Basal Ganglia Networks." Special Session on Some Mathematical Problems in Biology, from Macromolecules to Ecosystems. American Mathematical Society Sectional Meeting, Bloomington, IN, (April 2008).
- "Synchronization Patterns in Basal Ganglia." Mathematical Neuroscience – Neuroimaging meeting at Indiana University Purdue University Indianapolis (November 2007).

- "Dynamics of tremor networks in Parkinson's disease." Networks and Complex Systems Talk Series, Indiana University, Bloomington (April 2007).
- "Modeling pathophysiology of motor symptoms in Parkinson's disease." Special Session on Mathematical Modeling of Biological Systems. American Mathematical Society Sectional Meeting, Cincinnati, OH (October 2006).
- "How Basal Ganglia Control Motor Programs? Merging theoretical and experimental approaches to basal ganglia function in health and disease**.**" Department of Biology Lecture Series, IUPUI (March 2005).
- "Oscillatory Dynamics in Basal Ganglia Tremor-Supporting Networks." Neural Dynamics Laboratory Seminar, Krasnow Institute for Advance Study, George Mason University (November 2004).
- "Complex and Simple Dynamics in Neural Networks of Basal Ganglia." Biocomplexity Institute Seminar, Indiana University, Bloomington (October 2004).
- "Modeling facilitation and inhibition of competing motor programs in GPe-STN-GPi circuits of basal ganglia." Workshop on the Sensory-Motor Systems, Mathematical Biosciences Institute, Ohio State University, Columbus, OH (June 2003).

OTHER PRESENTATIONS

- "Potential functions of different temporal patterns of intermittent neural synchronization." 26th Annual Computational Neuroscience Meeting CNS*2017, Antwerp, Belgium (July 2017).
- "Network effects of optogenetic stimulation on synchronized neural oscillations." Indianapolis chapter of the Society for Neuroscience Annual Meeting, Indiana University, Indianapolis (March 2017).
- "Comparison of network effects of optogenetic and electrical stimulation on the synchronized oscillations in a computational model of parkinsonian basal ganglia." Society for Neuroscience 46th Annual Meeting, San Diego (November 2016).
- "Optogenetic vs. electrical stimulation of the parkinsonian basal ganglia. Computational study." 25th Annual Computational Neuroscience Meeting CNS*2016, Jeju, South Korea (July 2016).
- "Controlling synchronized oscillatory activity in a network of spiking/bursting neurons by electrical and optogenetic stimulation" Control and Observability of Network Dynamics. Mathematical Biosciences Institute, Columbus, OH (April 2016).
- "Effects of electrical and optogenetic deep brain stimulation on synchronized oscillatory activity in Parkinsonian basal ganglia" IUPUI Research Day 2016 (April 2016).
- "Temporal Patterning of Spike-LFP Synchronization in the Basal Ganglia in Parkinson's disease." Indianapolis chapter of the Society for Neuroscience Annual Meeting, Indiana University, Indianapolis (March 2016).

- "Effects of electrical and optogenetic deep brain stimulation on synchronized oscillatory activity in Parkinsonian basal ganglia" Indianapolis chapter of the Society for Neuroscience Annual Meeting, Indiana University, Indianapolis (March 2016).
- "Potential mechanisms and functions of short desynchronizations of neural oscillations." Society for Neuroscience 45th Annual Meeting, Chicago (October 2015).
- "Temporal Patterning of Spike-LFP Synchronization in the Basal Ganglia in Parkinson's disease." Gill Symposium, IUB (September 2015).
- "Short desynchronization epochs in neural synchronization: detection, mechanisms, and function." 24th Annual Computational Neuroscience Meeting CNS*2015, Prague, Czech Republic (July 2015).
- **"**Intermittent synchronization/desynchronization in population dynamics." SIAM conference on applications of dynamical systems, Snowbird, UT (May 2015).
- "Interaction of synchronized dynamics in cortical and subcortical circuits in Parkinson's disease." IUPUI Research Day 2015 (April 2015).
- "Correlation of synchronized dynamics in cortical and basal ganglia networks in Parkinson's disease." Society for Neuroscience 44th Annual Meeting, Washington, DC (November 2014).
- "The response of the subthalamo-pallidal networks of the Basal Ganglia to oscillatory cortical input in Parkinson's disease." 23nd Annual Computational Neuroscience Meeting CNS*2014, Quebec City, Canada (July 2014).
- "Fine temporal structure of neural synchronization." IUPUI Research Day 2014 (April 2014).
- "Cortex-Basal Ganglia synchronization in Parkinson's disease." IUPUI Research Day 2014 (April 2014).
- "Relating electrophysiology and symptoms in Parkinson's disease." IUCRG meeting, Indiana University, Indianapolis (March 2014).
- "Fine temporal structure of neural synchronization." Indianapolis chapter of the Society for Neuroscience Annual Meeting, Indiana University, Indianapolis (October 2013).
- "Dynamics of neural synchronization in prefronto-hippocampal networks during behavioral sensitization." Gill Symposium, IUB (September 2013).
- "Fine temporal structure of neural synchronization." 22nd Annual Computational Neuroscience Meeting CNS*2013, Paris, France (July 2013).
- "Dynamics of Short Desynchronization Episodes in the Brain." SIAM conference on applications of dynamical systems, Snowbird, UT (May 2013).
- "Dynamics of Synchronized Neural Activity in Prefrontal-Hippocampal Networks during Behavioral Sensitization." IUPUI Research Day 2013 (April 2013).
- "Dynamics of synchronized neural activity in prefronto-hippocampal networks during behavioral sensitization." Rhythms and Oscillations Workshop. Mathematical Biosciences Institute, Columbus, OH (March 2013).
- "Mechanisms of pathological synchrony in Parkinson's disease induced by changes in synaptic and cellular properties due to dopamine." 21st Annual Computational Neuroscience Meeting CNS*2012, Atlanta, GA (July 2012).

- “Synchronizing and desynchronizing effects of nonlinear delayed feedback deep brain stimulation in Parkinson’s disease.” 21th Annual Computational Neuroscience Meeting CNS*2012, Atlanta, GA (July 2012).
- “Fluctuating neural synchrony in the basal ganglia of parkinsonian patients: experimental observations, potential mechanisms, and functional implications.” Collaborative Research in Computational Neuroscience Principal Investigator Meeting, Washington University in St. Louis (June 2012).
- “Fine temporal patterning of intermittent synchronized oscillations in hippocampal and prefrontal circuits of the rat under repeated use of amphetamine”. Schizophrenia Workshop, Focus Program “Towards Mathematical Modeling of Neurological Disease from Cellular Perspectives”. Fields Institute, Toronto, ON, Canada (May 2012).
- “Acute d-Amphetamine alters the temporal patterning of intermittent synchronized oscillations in hippocampal and prefrontal circuits”. IUPUI Research Day 2012 (April 2012).
- “Acute d-Amphetamine alters the temporal patterning of intermittent synchronized oscillations in hippocampal and prefrontal circuits of the rat”. Society for Neuroscience 41th Annual Meeting, Washington, DC (November 2011).
- “Detecting the temporal structure of the phase locking: Parkinson’s disease and beyond” Collaborative Research in Computational Neuroscience Principal Investigator Meeting, Princeton University (October 2011).
- “Modulation of thalamocortical relay by basal ganglia in Parkinson’s disease and dystonia.” 20th Annual Computational Neuroscience Meeting CNS*2011, Stockholm, Sweden (July 2011).
- “Possible mechanisms underlying intermittent synchronous activity in the networks of excitatory and inhibitory bursting neurons.” 20th Annual Computational Neuroscience Meeting CNS*2011, Stockholm, Sweden (July 2011).
- “One Possible Mechanism Underlying Intermittently Synchronous Activity Patterns.” SIAM conference on applications of dynamical systems, Snowbird, UT (May 2011).
- “Modeling the origin of parkinsonian tremor.” IUPUI Research Day 2011 (April 2011).
- “Synchronous neural oscillations in Parkinson’s disease: variability and its potential network mechanisms.” IUPUI Research Day 2011 (April 2011).
- “Thalamocortical relay responses to inhibitory GPi inputs: Parkinson’s disease vs. dystonia." Society for Neuroscience 40th Annual Meeting, San Diego, CA (November 2010).
- “Modeling the origin of parkinsonian tremor.” 19th Annual Computational Neuroscience Meeting CNS*2010, San Antonio, TX (July 2010).
- “The time-course of synchronous neural oscillations in Parkinson’s disease: variability and its potential network mechanisms." Society for Industrial and Applied Mathematics (SIAM) Conference of Life Sciences, Pittsburg, PA (July 2010).
- "Intermittent synchronous neural oscillations in subthalamic nucleus in Parkinson's disease." 14th International Congress of Parkinson's Disease and Movement Disorders, Buenos Aires, Argentina (June 2010).
- “Neural synchronization in Parkinson’s disease." Collaborative Research in Computational Neuroscience Principal Investigator Meeting. Johns Hopkins University, Baltimore, Maryland (June 2010).

- “Fine temporal structure of beta-band synchronization in Parkinson's disease.” International Workshop "Trends in Complex Systems - Synchronization and Multiscale Complex Dynamics in the Brain". Max Planck Institute for the Physics of Complex Systems, Dresden, Germany (November 2009).
- “Dynamics and network mechanisms of intermittent synchronous oscillations in subthalamic nucleus in Parkinson’s disease.” Society for Neuroscience 39th Annual Meeting, Chicago, IL (October 2009).
- “Basal ganglia-thalamo-cortical loop mechanism of tremor in Parkinson's disease. Computational study.” Society for Neuroscience 39th Annual Meeting, Chicago, IL (October 2009).
- “Intermittent synchronous oscillations in subthalamic nucleus in Parkinson’s disease.” Dynamical Neuroscience XVII: Dynamical Diseases. Chicago, IL (October 2009).
- “Oscillations in the basal ganglia-thalamocortical loop as a mechanism of tremor in Parkinson’s disease.” Dynamical Neuroscience XVII: Dynamical Diseases. Chicago, IL (October 2009).
- “Dynamics of synchronized oscillations of neuronal activity in Parkinson’s disease.” International Conference on Mathematical Biology and Annual Meeting of the Society for Mathematical Biology, Vancouver, Canada, 2009.
- “Irregular vs. Synchronized activity in Basal Ganglia Circuits.” Computational and Systems Neuroscience Meeting COSYNE09, Salt Lake City, UT, 2009.
- “Intermittency of beta-band synchronized oscillations in human subthalamic nucleus in Parkinson’s disease.” Society for Neuroscience 38th Annual Meeting, Washington, DC, 2008.
- “Oscillations in basal ganglia circuits in Parkinson's disease: detection and modeling of intermittent synchronization.” Conference on dynamical systems in physiological modeling. Purdue University, 2008.
- “Intermittent patterns of synchronous activity in human basal ganglia.” 17th Annual Computational Neuroscience Meeting CNS*2008, Portland, OR, 2008.
- “Dynamics of Basal Ganglia Circuits in Parkinson's Disease.” Center for Mathematical Biosciences Open House, Indiana University Purdue University Indianapolis, 2007
- “Dynamics of basal ganglia – thalamocortical networks and parkinsonian tremor.” 15th Annual Computational Neuroscience Meeting CNS*2006, Edinburgh, UK, 2006
- “Modeling tremor-generating networks in Parkinson’s disease.” 2nd Young Researchers Workshop in Mathematical Biology, Mathematical Biosciences Institute, Ohio State University, Columbus, OH, 2006
- “Lesions in posteroventral pallidum in Parkinson's disease reduce burstiness of neuronal discharge.” Society for Neuroscience 35th Annual Meeting, Washington, DC, 2005
- “Synchronization through phase slips in the parkinsonian tremor network.” Society for Neuroscience 34th Annual Meeting, San Diego, 2004
- “The effect of pallidotomy on neuronal firing rates in the globus pallidus in parkinsonian patients.” Society for Neuroscience 34th Annual Meeting, San Diego, 2004
- “Normal and parkinsonian control of motor programs in pallidal and subthalamic networks of basal ganglia.” 13th Annual Computational Neuroscience Meeting CNS*2004, Baltimore, 2004

- “Selection and inhibition of competing motor programs in subthalamic and pallidal circuits of basal ganglia. Computational study.” Society for Neuroscience 33rd Annual Meeting, New Orleans, 2003
- “Statistical method based on Hilbert phase to detect transient phase locking and unlocking in neuronal oscillations.” Society for Neuroscience 33rd Annual Meeting, New Orleans, 2003
- “Model of basal ganglia motor control network and its dysfunction in Parkinson’s disease.” 7th International Conference on Cognitive and Neural Systems, Boston University, 2003
- “Intermittent front propagation in arrays of bistable oscillators.” International Symposium on Nonlinear Theory and Its Applications. Dresden, Germany, 2000
- “The action of disorder on oscillator death.” IEEE – IUTAM International Conference "Control of Oscillations and Chaos." St. Petersburg, Russia, 2000
- “The influence of disorder on oscillator death in inhomogeneous arrays of self-oscillators.” VII International School-Seminar “Wave Phenomena in Inhomogeneous Media.” Krasnovidovo, Russia, 2000
- “The influence of spatial disorder on the dynamics of inhomogeneous chain of coupled self-oscillators.” V International Conference “Nonlinear Oscillations in Mechanical Systems.” Nizhny Novgorod, Russia, 1999
- “The influence of disorder on oscillator death in smoothly inhomogeneous arrays of oscillators.” International Conference “Stochaos: Stochastic and Chaotic Dynamics in the Lakes.” Ambleside, UK, 1999
- “Dynamics of inhomogeneous chain of coupled self-oscillators with random scatter of natural frequencies.” Fourth Session of Young Scientists, Nizhny Novgorod, Russia, 1999
- “Anomalous relationship between spatial and temporal patterns of behavior and disorder-enhanced synchronization in arrays of identical oscillators.” 5th International School on Chaotic Oscillations and Pattern Formation CHAOS'98. Saratov, Russia, 1998
- “Control of cluster formation in inhomogeneous arrays of Van der Pol oscillators.” 5th International School on Chaotic Oscillations and Pattern Formation CHAOS'98. Saratov, Russia, 1998
- “Synchronized clusters control in arrays of self-excited oscillators with different natural frequencies.” International Workshop on Synchronization, Pattern Formation and Spatio-Temporal Chaos in Coupled Chaotic Oscillators. Santiago de Compostela, Spain, 1998
- “Anomalous relationship between spatial and temporal patterns of behavior in arrays of identical diffusively coupled oscillators.” International Workshop on Synchronization, Pattern Formation and Spatio-Temporal Chaos in Coupled Chaotic Oscillators. Santiago de Compostela, Spain, 1998
- “Anomalous relationship between spatial and temporal patterns of dynamics in chains of self-oscillators.” International Conference “Dynamics Days in Nizhny Novgorod.” Russia, 1998
- “Synchronized clusters and their control in the chains of self-oscillators with inhomogeneous distribution of natural frequencies.” VI School-Seminar “Wave Phenomena in Inhomogeneous Media.” Krasnovidovo, Russia, 1998

- “Chaos and multistability in complex Ginzburg-Landau equation.” 3rd Session of Young Scientists. Nizhny Novgorod, Russia, 1998
- “Periodic dynamics of spatial disorder.” Workshop “Dynamics Days.” Houston, Texas, January 1996
- “A simple nonlinear dynamical systems for modeling a complex oscillatory activity of a neuron.” International Conference on Complex Dynamics in Chemistry and Biology. Odense, Denmark, 1995
- “Temporal self-organization of patterns in complex Ginzburg-Landau equation.” International Conference “Criteria of self-organization in physical, chemical and biological systems.” Moscow - Suzdal, Russia, 1995

PUBLICATIONS

1. S. Ahn, S. E. Zauber, T. Witt, R.M. Worth, L.L. Rubchinsky (2018) Neural synchronization: average strength vs. temporal patterning. *Clinical Neurophysiology*. In press.

2. S. Ratnadurai-Giridharan, C.C. Cheung, L.L. Rubchinsky (2017) Effects of electrical and optogenetic deep brain stimulation on synchronized oscillatory activity in Parkinsonian basal ganglia. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 25:2188–2195.

3. S. Ahn, L.L. Rubchinsky (2017) Potential mechanisms and functions of intermittent neural synchronization. *Frontiers in Computational Neuroscience* 11:44.

4. L.L. Rubchinsky, S. Ahn, C. Park (2017) Dynamics of intermittent synchronization of neural activity. In "*Advances in Dynamics, Patterns, Cognition*", ed. by I.S. Aranson, A. Pikovsky, N.F. Rulkov, and L. Tsimring, pp. 263-275. Springer.

5. S. Ahn, S.E. Zauber, R.M. Worth, L.L. Rubchinsky (2016) Synchronized beta-band oscillations in a model of the globus pallidus - subthalamic nucleus network under external input. *Frontiers in Computational Neuroscience* 10:134.

6. S. Ratnadurai-Giridharan, S.E. Zauber, R.M. Worth, T. Witt, S. Ahn, L.L. Rubchinsky (2016) Temporal patterning of neural synchrony in the basal ganglia in Parkinson's disease. *Clinical Neurophysiology*, 127:1743–1745.

7. L.L. Rubchinsky, S. Ahn (2015) Short desynchronization epochs in neural synchronization: detection, mechanisms, and functions. *BMC Neuroscience* 16 (Suppl 1): P3.

8. S. Ahn, S. E. Zauber, T. Witt, R.M. Worth, L.L. Rubchinsky (2015) Interaction of synchronized dynamics in cortical and basal ganglia in Parkinson's disease. *European Journal of Neuroscience*, 42: 2164–2171.

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