

Ilya Prokin | CURRICULUM VITAE

Ph.D. candidate, Project-Team BEAGLE, INRIA Rhône-Alpes, Lyon, France

b 1/3/1987 in Dzerzhinsk, gorki Region, USSR

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RESEARCH INTERESTS

Computational Neuroscience, Network and Learning Theories, Machine Learning, Artificial Intelligence.

EDUCATION

- 2013–present** **Ph.D. Computational Neuroscience**, *INRIA Rhône-Alpes, Lyon, France.*
- 2011–2013** **M.Sc. Physics** (GPA: 4.625/5), *N.I. Lobachevsky State University of Nizhny Novgorod, Nizhny Novgorod, Russia.*
- 2007–2011** **B.Sc. Physics** (GPA: 4.1/5), *Department of Radiophysics, N.I. Lobachevsky State University of Nizhny Novgorod, Nizhny Novgorod, Russia.*
Courses included: Computational Methods, Dynamical Systems, Probability Theory, Calculus, and Linear Algebra.

RESEARCH EXPERIENCE

- Oct. 2013–present** **Ph.D. Research**, *INRIA Rhône-Alpes, Lyon, France*, Group of Hugues Berry, Project: Modeling emergence of Spike-Timing Dependent Plasticity from biochemical reactions.
- Developed a Data-Driven Mathematical Model which explained the dependence of synaptic learning on the activity of neurons and experimental conditions (<https://github.com/iprokin/Cx-Str-STDP>); this included numerical integration of Ordinary Differential Equations, Parameter Optimization, Sensitivity Analysis and collaboration with experimentalists for model validation.
 - Python for Data Analysis (NumPy, SciPy, PANDAS, sklearn, and matplotlib) and Numerical Optimization (PyGMO); Numerical Integration in FORTRAN95 interfaced with Python using f2py (x100 faster than Python+SciPy+NumPy).
- July–Aug. 2013** **Research Internship**, *Semyanov Lab, RIKEN Brain Science Institute, Saitama, Japan*, Group of Alexey Semyanov, Project: 3-D reconstruction of neuronal spines from two-photon microscopy images.
- 2011–2013** **Graduate Research**, *Lab. of Nonlinear Processes in Living Systems, Institute of Applied Physics of the Russian Academy of Sciences, Nizhny Novgorod, Russia*, Group of Viktor Kazantsev, Project: Connectivity graph reconstruction from multi-electrode recordings of neuronal activity.
- 2009–2013** **Undergraduate Research**, *Dept. of Neurodynamics and Neurobiology, Biological Faculty, N.I. Lobachevsky State University of Nizhny Novgorod, Nizhny Novgorod, Russia*, Group of Victor Kazantsev, Project: Modeling of Neural Networks with dynamic connectivity.

SKILLS

- OS** GNU/Linux and OS X (3 years), and Windows (14 years).
- Programming** Python 2.7/3.5 (including SciPy, NumPy, PANDAS, PyGMO, PyDSTool, and sklearn) (>20000 SLOC¹), Fortran 90/95 (>3000 SLOC), bash (>1500 SLOC), C/C++ (>12000 SLOC), familiar with Haskell (>200 SLOC)
- Technologies** git, make, HTML, CSS, and \LaTeX .
- Other software** MATLAB/Octave (>25000 SLOC), familiar with XPPAUT, NEURON, GENESIS, NEST, and LabView.

AWARDS

- Apr. 2013** **Best Graduate Research**, *N.I. Lobachevsky State University of Nizhny Novgorod.*
- Jan.–June 2013** **The Dynasty Foundation Scholarship**, One of 40 winners out of 149 applicants.

¹SLOC: Source Lines Of Code

Jan-Dec. 2012	Research Achievements Scholarship , <i>N.I. Lobachevsky State University of Nizhny Novgorod</i> , Given to 12 out of about 250 students.
15 May 2012	Best Talk Award , 16th Scientific Conference on Radiophysics, <i>N.I. Lobachevsky State University of Nizhny Novgorod</i> , One winner of 14 presenters.
LANGUAGES	Russian (native), English (fluent), French (working knowledge).
PUBLICATIONS	<ul style="list-style-type: none"> • Xu H, Perez S, Detraux B, Cornil A, Prokin I, Cui Y, et al. Endocannabinoid-dopamine interactions mediate spike-timing dependent potentiation in the striatum. <i>Nature Communications</i>. Nature Publishing Group; submitted, 2016. • Cui Y, Prokin I, Xu H, Delord B, Genet S, Venance L, et al. Endocannabinoid dynamics gate spike-timing dependent depression and potentiation. <i>eLife</i>. eLife Sciences Publications Limited; 2016. • Prokin I, Tyukin I, Kazantsev V. Phase selective oscillations in two noise driven synaptically coupled spiking neurons. <i>International Journal Bifurcation and Chaos</i>. World Scientific Publishing Company; 2015. • Prokin I, Kazantsev V. Synchronization in the system of synaptically coupled neural oscillators with frequency-dependent coupling. <i>Radiophysics and Quantum Electronics</i>. Springer US; 2015. • Prokin I, Kazantsev V. Analysis of pulsed-signal transmission in a system of interacting neural oscillators with frequency-dependent Radiophysics and Quantum Electronics. Springer US; 2012.
COMMUNICATIONS	<ul style="list-style-type: none"> • Prokin I, Valtcheva S, Venance L, Berry H. Mechanistic modeling of spike-timing dependent plasticity of basal ganglia neurons. <i>Neuroscience Chicago, United States of America: Society for Neuroscience</i>; 2015. • Prokin I, Cui Y, Valtcheva S, Venance L, Berry H. Modeling spike-timing dependent plasticity of basal ganglia neurons and its bidirectional control by endocannabinoid signaling. Advanced lecture course on computational systems biology. Aussois, France; 2015. • Prokin I, Gladkov A, Mukhina I, Kazantsev V. Detection of multiple spike transmission pathways in neuronal networks based on multichannel recordings. 8th Int Meeting on Substrate-Integrated Microelectrodes. Reutlingen, Germany: NMI Natural; Medical Sciences Institute at the University of Tübingen; 2012. • Prokin I, Kazantsev V. Identifying functional connectivity multigraph in the time maps networks by the sample of multidimensional point Proceedings of the 16th scientific conference on radiophysics. Nizhny Novgorod, Russia: N.I. Lobachevsky State University of Nizhny Novgorod; 2012.
TALKS	
30 Oct. 2015	"Mechanistic Modeling of Spike-Timing Dependent Plasticity of Basal Ganglia Neurons", <i>University of Chicago, Chicago, United States of America</i> .
16 July 2012	"Detection of multiple spike transmission pathways in neuronal networks based on multichannel recordings", <i>Institute for Theoretical Biology, Humboldt-Universität zu Berlin, Berlin, Germany</i> .
4 June 2012	Introductory lecture to Lyle Graham lecture at the summer school in Computational Neuroscience "White Nights of Computational Neuroscience: Neurotheory from cell to cognition 2012", <i>Saint-Petersburg State University, Saint-Petersburg, Russia</i> .
ADDITIONAL CLASSES AND SCHOOLS	
6-11 Apr. 2015	Advanced Lecture Course on Computational Systems Biology, <i>INRIA, Aussois, France</i> .
4-15 June 2012	Summer school in Computational Neuroscience: "White Nights of Computational Neuroscience: Neurotheory from cell to cognition", <i>Saint-Petersburg State University, Saint-Petersburg, Russia</i> .

- 29 Feb.–6 Mar. 2012** XVI Scientific school “Nonlinear Waves”, Fundamental and applied problems of nonlinear physics, *Institute of Applied Physics of the Russian Academy of Sciences, Nizhny Novgorod, Russia.*
- 3–7 Oct. 2011** International school “Towards neuromorphic intelligence: experiments, models and technologies”, *N.I. Lobachevsky State University of Nizhny Novgorod, Nizhny Novgorod, Russia.*
- 14–17 Sept. 2011** Modular course “Background techniques for Neurophysics: dynamical system theory, statistical physics, wavelet analysis”, *Saint-Petersburg State University, Saint-Petersburg, Russia.*
- 7–9 Apr. 2011** Modular course “Cellular mechanisms of information transfer: neuronal and synaptic plasticity”, *Saint-Petersburg State University, Saint-Petersburg, Russia.*

REFERENCES

Hugues Berry, Ph.D.

Senior Researcher

Project-Team BEAGLE

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