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 form biochemical reactions.

- Developed a Data-Driven Mathematical Model which explained the dependence of synaptic learning on the activity of neurons and experimental conditions. See https://github.com/iprokin/Cx-Str-STDP.
- Numerically solved the complex system of Ordinary Differential Equations describing the model; this included 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 SLOC[1]), 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*.

[1] SLOC: Source Lines Of Code

Jan.–June 2013 **The Dynasty Foundation Scholarship**, One of 40 winners out of 149 applicants.

Jan–Dec. 2012 **Research Achievements Scholarship**, *N.I. Lobachevsky State University of Nizhny Novgorod*, Given to 12 out of about 250 students.

15 May 2012 **Best Talk Award**, 16th Scientific Conference on Radiophysics, *N.I. Lobachevsky State University of Nizhny Novgorod*, One winner of 14 presenters.

LANGUAGES Russian (native), English (fluent), French (working knowledge).

PUBLICATIONS

- 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. Nature Communications. 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. eLife. eLife Sciences Publications Limited; 2016.
- **Prokin** I, Tyukin I, Kazantsev V. Phase selective oscillations in two noise driven synaptically coupled spiking neurons. International Journal Bifurcation and Chaos. World Scientific Publishing Company; 2015.
- **Prokin** I, Kazantsev V. Synchronization in the system of synaptically coupled neural oscillators with frequency-dependent coupling. Radiophysics and Quantum Electronics. 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

- **Prokin** I, Valtcheva S, Venance L, Berry H. Mechanistic modeling of spike-timing dependent plasticity of basal ganglia neurons. Neuroscience Chicago, United States of America: Society for Neuroscience; 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 Tubingen; 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", *University of Chicago, Chicago, United States of America*.

16 July 2012 "Detection of multiple spike transmission pathways in neuronal networks based on multichannel recordings", *Institute for Theoretical Biology, Humboldt-Universität zu Berlin, Berlin, Germany*.

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", *Saint-Petersburg State University, Saint-Petersburg, Russia*.

ADDITIONAL CLASSES AND SCHOOLS

6–11 Apr. 2015 Advanced Lecture Course on Computational Systems Biology, *INRIA, Aussois, France*.

4–15 June 2012 Summer school in Computational Neuroscience: "White Nights of Computational Neuroscience: Neurotheory from cell to cognition", *Saint-Petersburg State University, Saint-Petersburg, Russia*.

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.
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