Ilya Prokin | CURRICULUM VITAE

+33 6 69 56 61 88 isprokin@gmail.com | https://iprokin.github.io https://github.com/iprokin

RESEARCH INTERESTS

CORE PROFICIENCIES — Computational Science, Nonlinear Dynamics, and Theoretical Neuroscience.
COMPLEMENTARY EXPERTISE — Physics, Probability Theory, Statistics, and Machine Learning.

EDUCATION

Ph.D. Computational Neuroscience — 2013 Oct.-2016 Dec.
INRIA Rhône-Alpes — Villeurbanne, France

M.Sc. Physics (GPA: 4.63/5) — 2011-2013
Lobachevsky State University of Nizhny Novgorod (UNN) — Nizhny Novgorod, Russian Federation

B.Sc. Physics (GPA: 4.1/5) — 2007-2011
Lobachevsky State University of Nizhny Novgorod (UNN) — Nizhny Novgorod, Russian Federation
Courses included: Computational Methods, Dynamical Systems, Probability Theory, Calculus, and Linear Algebra.

RESEARCH EXPERIENCE

Ph.D. Research — 2013 Oct.-2016 Dec.
INRIA Rhône-Alpes — Villeurbanne, France

- 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 Ordinary Differential Equations describing the model; this included Stochastic Simulations, Parameter Optimization, Sensitivity Analysis and collaboration with experimentalists.
- 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).
- 1 scientific publication, 1 submitted, 2 in preparation.

Research Internship — 2013 July-Aug.
RIKEN Brain Science Institute — Saitama, Japan

- 3-D reconstruction of neuronal spines from a stack of two-photon microscopy images in MATLAB; the software is used in the UNN in Russia and in College-de-France in Paris, France.

Graduate Research — 2011-2013
Institute of Applied Physics — Nizhny Novgorod, Russian Federation

- Architected a new method for graph reconstruction from the time-series data generated by graph's nodes.
- Time-series correlation and its statistical significance in C++; data manipulation/visualization in MATLAB.

Undergraduate Research — 2009-2013
Lobachevsky State University of Nizhny Novgorod — Nizhny Novgorod, Russian Federation

- Solved numerically Differential Equations based Neural Network with a customized Runge-Kutta in C++.
- 2 international scientific publications describing the model of interacting neurons and an adaptive synapse.

INDEPENDENT PROJECTS

- Participated in Two Sigma Financial Modeling Challenge at https://www.kaggle.com.
- Machine Learning powered RSS reader, built with Python and Naive Bayes approach with web-UI (CSS/HTML/JavaScript/Python). https://github.com/MLdog/nayesdog.
- Py_XPPCALL: Python interface to XPPAUT. https://github.com/iprokin/Py_XPPCALL.
- Prediction of San Francisco crimes using Deep Learning on GPU with Keras Python module.
- Built a server on Raspberry Pi with Dynamic DNS, SSH, git, OpenVPN, TaskWarrior, and Syncthing.

SKILLS

- OS: GNU/Linux and OS X (3 years), FreeBSD (3 months), and Windows (14 years).
- Technologies: Python 2.7/3.5 (including SciPy, NumPy, PANDAS, and sklearn) (>25000 SLOC[1]), Fortran 90/95 (>3000 SLOC), bash (>1500 SLOC), C/C++ (>15000 SLOC), MATLAB/Octave (>25000 SLOC), HTML, CSS, LaTeX; familiar with Haskell (>500 SLOC), SQL, InfluxQL, and tools as XPPAUT, NEURON, NEST, and LabView.

LANGUAGES

- Russian (native), English (C2, fluent), French (B1, working knowledge).

AWARDS

- Best Graduate Research, UNN, Apr. 2013.
- **The Dynasty Foundation scholarship**, Jan.-June 2013. One of 40 winners out of 149 applicants.
- Research Achievements scholarship, UNN, Jan.-Dec. 2012. Given to 12 out of about 250 students.
- Best Talk award, 16th Scientific Conference on Radiophysics, UNN, 15 May 2012. One winner of 14 presenters.

PUBLICATIONS

- Cui, Yihui, Ilya **Prokin**, Hao Xu, Bruno Delord, Stéphane Genet, Laurent Venance, and Hugues Berry. "Endocannabinoid Dynamics Gate Spike-Timing Dependent Depression and Potentiation." *ELife* 5 (2016).
- Xu, Hao, Sylvie Perez, Bérangère Detraux, Amandine Cornil, Ilya **Prokin**, Yihui Cui, Bertrand Degos, Hugues Berry, Albande de Kerchove d'Exaerde, and Laurent Venance. "Endocannabinoid-Dopamine Interactions Mediate Spike-Timing Dependent Potentiation in the Striatum." *Nature Communications*, submitted, 2016.
- **Prokin**, Ilya, Ivan Tyukin, and Victor Kazantsev. "Phase Selective Oscillations in Two Noise Driven Synaptically Coupled Spiking Neurons." *International Journal of Bifurcation and Chaos* 25, no. 07 (2015).
- **Prokin**, IS, and VB Kazantsev. "Synchronization in the System of Synaptically Coupled Neural Oscillators with Frequency-Dependent Coupling." *Radiophysics and Quantum Electronics* 57, no. 10 (2015).
- **Prokin**, IS, and VB Kazantsev. "Analysis of Pulsed-Signal Transmission in a System of Interacting Neural Oscillators with Frequency-Dependent Connections." *Radiophysics and Quantum Electronic*s 54, no. 11 (2012).

COMMUNICATIONS

- **Prokin**, I. "Mechanistic Modeling of Spike-Timing Dependent Plasticity of Basal Ganglia Neurons." 2015 University of Chicago, Chicago, United States of America. (**Talk**).
- **Prokin**, Ilya, Yihui Cui, Silvana Valtcheva, Laurent Venance, and Hugues Berry. "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 (**Poster**).
- **Prokin**, Ilya, Silvana Valtcheva, Laurent Venance, and Hugues Berry. "Mechanistic Modeling of Spike-Timing Dependent Plasticity of Basal Ganglia Neurons." *Neuroscience 2015*. Chicago, United States of America: Society for Neuroscience, 2015 (**Poster**).
- **Prokin**, I. "Detection of Multiple Spike Transmission Pathways in Neuronal Networks Based on Multichannel Recordings." 2012 Institute for Theoretical Biology, Humboldt-Universität zu Berlin, Berlin, Germany. (**Talk**).
- **Prokin**, I. "Introductory Lecture to Lyle Graham Lecture at the Summer School in Computational Neuroscience 'White Nights of Computational Neuroscience: Neurotheory from Cell to Cognition 2012'." 2012 Saint-Petersburg State University, Saint-Petersburg, Russian Federation. (**Talk**).
- **Prokin**, I, and V Kazantsev. "Identifying Functional Connectivity Multigraph in the Time Maps Networks by the Sample of Multidimensional Point Process." *Proceedings of the 16th Scientific Conference on Radiophysics*. Nizhny Novgorod, Russia: N.I. Lobachevsky State University of Nizhny Novgorod, 2012.
- **Prokin**, I, A Gladkov, I Mukhina, and V Kazantsev. "Detection of Multiple Spike Transmission Pathways in Neuronal Networks Based on Multichannel Recordings." *8th Int. Meeting on Substrate-Integrated Microelectrodes*, 226–27. Reutlingen, Germany: NMI Natural; Medical Sciences Institute at the University of Tubingen, 2012.

ADDITIONAL CLASSES AND SCHOOLS

- Advanced Lecture Course on Computational Systems Biology. INRIA, Aussois, France. 6-11 Apr. 2015.
- Summer school in Computational Neuroscience: "White Nights of Computational Neuroscience: Neurotheory from cell to cognition". Saint-Petersburg State University, Saint-Petersburg, Russian Federation. 4-15 June 2012.
- XVI Scientific school "Nonlinear Waves", Fundamental and applied problems of nonlinear physics. Institute of Applied Physics, Nizhny Novgorod, Russian Federation. 29 Feb.-6 Mar. 2012.
- International school "Towards neuromorphic intelligence: experiments, models and technologies". Lobachevsky State University of Nizhny Novgorod, Nizhny Novgorod, Russian Federation. 3-7 Oct. 2011.
- Modular course "Background techniques for Neurophysics: dynamical system theory, statistical physics, wavelet analysis". Saint-Petersburg State University, Saint-Petersburg, Russian Federation. 14-17 Sept. 2011.
- Modular course "Cellular mechanisms of information transfer: neuronal and synaptic plasticity". Saint-Petersburg State University, Saint-Petersburg, Russian Federation. 7-9 Apr. 2011.

REFERENCES

Hugues Berry, Ph.D.
Senior Researcher
Project-Team BEAGLE
INRIA Rhône-Alpes
Université de Lyon LIRIS UMR5205
56 Blvd Niels Bohr, Villeurbanne, 69603, France
Tel.(Office): +33 4 72 43 75 01
Tel.(C. Suter, assistant): +33 4 72 43 74 90
hugues.berry@inria.fr
http://www.inrialpes.fr/Berry

Victor Kazantsev, Ph.D.
Vice-Rector for Research and Innovation
Nizhny Novgorod Neuroscience Center
University of Nizhny Novgorod
23 b., 7 h., Gagarina ave, Nizhny Novgorod, 603950, Russia
Tel. (Office): +7 (831) 462 37 64
Tel. (Mobile): +7 (920) 111 91 44
kazantsev@neuro.nnov.ru
http://neuro.nnov.ru

1. SLOC: Source Lines Of Code↩