Ilya Prokin | CURRICULUM VITAE

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Russian national with French visa and right to work in France

CORE PROFICIENCIES	Computational Neuroscience.
COMPLEMENTARY EXPERTISE	Physics, Computer Science, 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.
- Worked with various experimental and synthetic datasets: Data Cleaning, Parsing, Transformation and Modeling.
- Numerical Stochastic Simulations of Differential Equations, Parameter Optimization, Sensitivity Analysis.
- 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 (*eLife*, top 10% journal in biology/neuroscience), 2 submitted, 1 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.

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

- Processing 64-dimensional time-series data recorded from neuronal cultures grown on multi-electrode arrays.
- Architected a 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 model of a 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

- Halite II AI Programming Challenge (ongoing, currently top 4%). https://halite.io/user/?user_id=2559.
- Bitcoin price predition & betting bot for btc-e.com (Python/sklearn/selenium).
- Participated in Two Sigma Financial Modeling Challenge on 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.
- Prediction of San Francisco crimes using Deep Learning on GPU with Keras Python module.
- Py_XPPCALL: Python interface to XPPAUT. https://github.com/iprokin/Py_XPPCALL.
- PokerC, Poker Odds Calculator (Haskell). https://github.com/iprokin/pokerc.
- Haskell parser of Kospi market data from UDP packets in pcap file. https://github.com/iprokin/pcapKospi200.
- Built a server on Raspberry Pi with Dynamic DNS, SSH, git, OpenVPN, TaskWarrior, and Syncthing.

SKILLS

- OS: GNU/Linux and OS X (4 years), FreeBSD (3 months), and Windows (14 years).
- Technologies: Python 2.7/3 (including SciPy, NumPy, PANDAS, and sklearn) (>25000 SLOC[1]), Fortran 90/95 (>3000 SLOC), bash/zsh (>2500 SLOC), C/C++ (>15000 SLOC), MATLAB/Octave (>25000 SLOC), Haskell (>5000 SLOC), HTML, CSS, LaTeX, SQL; familiar with InfluxQL, XPPAUT, NEURON, NEST, and LabView.
- Languages: Russian (native), English (fluent), French (limited working proficiency).

AWARDS

- INRIA PhD Fellowship, INRIA, Oct. 2013 - Dec. 2016.
- 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

- Prokin, Ilya, Yihui Cui, Alexandre Mendes, Hugues Berry, and Laurent Venance, "Robustness of STDP to spike-timing jitter.", *PLoS Comp Biol* (2017, on review).
- Gangarossa, Giuseppe, Sylvie Perez, Yulia Dembitskaya, Ilya Prokin, Hugues Berry, and Laurent Venance, "BDNF controls endocannabinoid-mediated plasticity in striatum." (2017, in preparation).
- 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." (2017, in preparation).
- 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).
- 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 Electronics* 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

- Data Science Summer School. École Polytechnique, Palaiseau, France. 28 Aug. - 1 Sept., 2017.
- 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

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1. SLOC: Source Lines Of Code↩