

# SERGEY SHUVAEV

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Ph.D. in applied mathematics and physics with focus on computer science and neuroscience  
Research focus on using machine learning to develop biologically-informed models of decision-making

## Experience

**Postdoctoral Fellow** 11/22-now, **Student in Residence** 7/16-10/22,

*Koulakov Lab*, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY

- Developed data-driven models of decision-making for stay-or-leave decisions ([NeurIPS '20](#)), motivation ([Front Sys Neurosci '21](#)), and conflict behavior ([arXiv '23](#))
- Co-developed approaches to network compression ([bioRxiv '21](#)) and self-assembly ([PNAS '19](#))
- Analyzed olfactory system: function of receptors ([ICML '19](#)) and role of connectivity ([bioRxiv '23](#))

**Research Associate** 7/16-12/18, **Research Assistant** 1/12-6/16,

*Enikolopov Lab*, Moscow Institute of Physics and Technology, Moscow, Russia

- Developed automatic procedures to analyze cell populations in whole-brain samples: microscopy ([MethodsX '19](#)), brain alignment ([Sci Reports '22](#)), and cell detection ([Front Neuroanat '17](#))
- Performed microscopy and analyzed data to evaluate common impacts on adult neurogenesis: irradiation ([NeuroReport '19](#)); antidepressants, brain development, and cell migration

**Research Assistant** 8/13-7/15, *Superconductivity Department*, Kurchatov Institute, Moscow, Russia

- Developed numerical models and worked towards experimental measurements of electro- and thermodynamics in high-current superconductive cables to pursue requirement-based design

## Education

**Ph.D., Physics and Mathematics (Biophysics)**, Moscow Institute of Physics and Technology, 2022

**M.S., Applied Mathematics and Physics**, Moscow Institute of Physics and Technology, 2015, GPA 4.0

**B.S., Applied Mathematics and Physics**, Moscow Institute of Physics and Technology, 2013, GPA 4.0

## Publications

- 10+ publications, 100+ citations; **see next page for details**
- 5 first-authored papers (incl. [NeurIPS](#) and [PNAS](#)); 3 co-authored papers (incl. [ICML](#)); 4 preprints

## Professional service

**Reviewer** for [NeurIPS](#), [ICLR](#), [ICML](#), [COSYNE](#)

## Skills and qualifications

- Python, PyTorch, TensorFlow, Matlab, Wolfram Mathematica, C, C++, git, shell, LaTeX
- Computational neuroscience, reinforcement learning, Bayesian inference, game theory, sequence modeling, computer vision

## Awards

- Highlighted Reviewer: [ICLR](#), 2022; [NeurIPS](#), 2022. *Awarded to top-5%/top-10% reviewers*
- Travel awards: CSHL; Gatsby Charitable, Burroughs Wellcome, Google DeepMind, Simons, 2020
- Swartz Fellow in Computational Neuroscience, 2016-2017. *\$100k+/2yrs toward salary and travel*
- Alexandrov Scholar, 2012-2015. *Awarded to students with recent conference records & top-tier GPA*
- Abramov and Frolov Scholar, 2010-2012. *Awarded to undergraduate students with the 4.0 GPA*
- Kurchatov Award for Outstanding Research, 2013

August 2023

## Publications

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The primacy model and the structure of olfactory space (bioRxiv '23)

Giaffar, H., **Shuvaev, S.**, Rinberg, D., and Koulakov, A.

A normative theory of social conflict (arXiv '23)

**Shuvaev, S.**, Amelchenko, E., Smagin, D., Kudryavtseva, N., Enikolopov, G., and Koulakov, A.

Spatiotemporal 3D image registration for mesoscale studies of brain development (Sci Reports '22)

**Shuvaev, S.**, Lazutkin, A., Kiryanov, R., Anokhin, K., Enikolopov, G., and Koulakov, A.

Encoding innate ability through a genomic bottleneck (bioRxiv '21)

Koulakov, A., **Shuvaev, S.**, Lachi, D., and Zador, A.

Neural networks with motivation (Front Sys Neurosci '21)

**Shuvaev, S.**, Tran, N., Stephenson-Jones, M., Li, B., and Koulakov, A.

R-learning in actor-critic model offers a biologically relevant mechanism for sequential decision-making (NeurIPS '20)

**Shuvaev, S.\***, Starosta, S.\*, Kvitsiani, D., Kepecs, A., and Koulakov, A.

DeepNose: Using artificial neural networks to represent the space of odorants (ICML '19)

Tran, N., Kepple, D., **Shuvaev, S.**, and Koulakov, A.

Network cloning using DNA barcodes (PNAS '19)

**Shuvaev, S.**, Başerdem, B., Zador, A., and Koulakov, A.

Click histochemistry for whole-mount staining of brain structures (MethodsX '19)

Lazutkin, A., **Shuvaev, S.**, and Barykina, N.

Suppressed neurogenesis without cognitive deficits: effects of fast neutron irradiation in mice (NeuroReport '19)

Mineyeva, O., Barykina, N., Bezriadnov, D., ..., **Shuvaev, S.**, Usova, S., and Lazutkin, A.

DALMATIAN: an algorithm for automatic cell detection and counting in 3D (Front Neuroanat '17)

**Shuvaev, S.**, Lazutkin, A., Kedrov, A., Anokhin, K., Enikolopov, G., and Koulakov, A.

Representations of sound in deep learning of audio features from music (arXiv '17)

**Shuvaev, S.**, Giaffar, H., and Koulakov, A.

**Details:** [scholar.google.com/citations?user=A2rXeeQAAAAJ](https://scholar.google.com/citations?user=A2rXeeQAAAAJ)