# ILYA SCHUROV

*Curriculum Vitae*

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## Research Interests

Machine Learning, Differential Equations, Dynamical Systems.

## Professional Experience

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|---|---|
| 2025—current | **Memeber of Technical Staff**, *Omnifold, Inc.*, remote from The Netherlands (via Deel). |
| 2022—2025 | **Postdoctoral Researcher**, *The Department of Theory of Condensed Matter, Faculty of Science, Radboud University*, Nijmegen, The Netherlands. |
| 2022 | **Associate Professor**, *Faculty of Mathematics, HSE University*, Moscow, Russia. |
| 2020 — 2022 | **Senior Research Fellow**, *Linguistic Convergence Laboratory, HSE University*, Moscow, Russia. |
| 2018 — 2020 | **Senior Research Fellow**, *Sport Studies Laboratory, HSE University*, Moscow, Russia. |
| 2010 — 2022 | **Assistant, Associate Professor**, *Department of Higher Mathematics, HSE University*, Moscow, Russia. |

## Education

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| 2010 | **Ph. D. (Candidate of Sciences), Mathematics**, *Moscow State University*. <br> Dissertation topic: Canard solutions in slow-fast systems on the two-torus. Advisor: Yulij S. Ilyashenko |
| 2006 | **M. Sc. (Specialist), Mathematics**, *Moscow State University*, Graduated cum laude. |

## Textbooks

Calculus. Lecture notes. (Russian) https://calculus.mathbook.info

Ordinary differential equations. Interactive textbook. (Russian) https://ode.mathbook.info

## Publications

### Preprints

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|---|---|
| 2024 | I. Schurov, D. Alforov, M. Katsnelson, A. Bagrov, and A. Itin. Invariant multiscale neural networks for data-scarce scientific applications, 2024. [arXiv:2406.08318]. |

### Peer-reviewed papers

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|---|---|
| 2024 | Yuri I. Wolf, Ilya V. Schurov, Kira S. Makarova, Mikhail I. Katsnelson, and Eugene V. Koonin. Long range segmentation of prokaryotic genomes by gene age and functionality. *Nucleic Acids Research*, page gkae745, 08 2024. [DOI]. |
| 2022 | Michael Daniel, Alexey Koshevoy, Ilya Schurov, and Nina Dobrushina. Can recall data be trusted? evaluating reliability of interview data on traditional multilingualism in highland daghestan. *Field Methods*, volume 34, pages 288–302, 2022. [DOI]. |
| 2020 | Dmitry Dagaev and Ilya Schurov. Bachet's game with lottery moves. *Discrete Mathematics*, volume 343, page 111704, 2020. [DOI] [arXiv]. |

2019 Michael Daniel, Ruprecht von Waldenfels, Aleksandra Ter-Avanesova, Polina Kazakova, Ilya Schurov, Ekaterina Gerasimenko, Daria Ignatenko, Ekaterina Makhlina, Maria Tsfasman, Samira Verhees, and et al. Dialect loss in the russian north: Modeling change across variables. *Language Variation and Change*, volume 31, page 353–376. Cambridge University Press, 2019. [DOI] [code].

2018 Yu. Ilyashenko, Yu. Kudryashov, and I. Schurov. Global bifurcations in the two-sphere: a new perspective. *Inventiones mathematicae*, volume 213, pages 461–506, 2018. [DOI] [arXiv].

2017 Ilya V. Schurov. Qqmbr and indentml: Extensible mathematical publishing for web and paper. In *Proceedings of the 2017 ACM Symposium on Document Engineering*, DocEng '17, page 121–124, New York, NY, USA, 2017. Association for Computing Machinery. [DOI] [code].

2017 Ilya Schurov and Nikita Solodovnikov. Duck factory on the two-torus: Multiple canard cycles without geometric constraints. *Journal of Dynamical and Control Systems*, volume 23, pages 481–498, 2017. [DOI] [arXiv].

2015 V. Kleptsyn, A. Okunev, I. Schurov, D. Zubov, and M. I. Katsnelson. Chiral tunneling through generic one-dimensional potential barriers in bilayer graphene. *Phys. Rev. B*, volume 92, page 165407. American Physical Society, Oct 2015. [DOI] [arXiv].

2014 A. A. Glutsyuk, V. A. Kleptsyn, D. A. Filimonov, and I. V. Schurov. On the adjacency quantization in an equation modeling the Josephson effect. *Funct. Anal. Appl.*, volume 48, pages 272–285. Springer US, New York, NY, 2014. [DOI] [arXiv].

2013 O. V. Romaskevich, V. A. Kleptsyn, and I. V. Schurov. Josephson effect and fast-slow systems. *Nanostructures. Mathematical Physics and Modelling*, volume 8, pages 31–46, 2013.

2011 Ilya Schurov. Duck farming on the two-torus: Multiple canard cycles in generic slow-fast systems. *Discrete and Continuous Dynamical Systems*, volume Supplement 2011, pages 1289–1298, 2011. [DOI] [arXiv].

2011 P. I. Kaleda and I. V. Shchurov. Cyclicity of elementary polycycles with fixed number of singular points in generic $k$-parameter families. *St. Petersbg. Math. J.*, volume 22, pages 557–571. American Mathematical Society (AMS), Providence, RI, 2011. [DOI].

2010 I. V. Shchurov. Canard cycles in generic fast-slow systems on the torus. *Trans. Mosc. Math. Soc.*, volume 2010, pages 175–207. American Mathematical Society (AMS), Providence, RI, 2010. [DOI].

2010 I. V. Schurov. Ducks on the torus: existence and uniqueness. *Journal of Dynamical and Control Systems*, volume 16, pages 267–300, 2010. [DOI] [arXiv].

## Selected Talks

2024 **Sign Structures as a Source of Complexity in Quantum Frustrated Magnetic Systems**, *Seminar of Dutch Institute for Emergent Phenomena*, Amsterdam, The Netherlands, 5 December 2024.

2024 **Ground State Sign Structures as Boolean Functions**, *NWO Physics*, Veldhoven, The Netherlands, 24 January 2024.

2019 **Variational Autoencoders beyond Euclidian Spaces**, *Seminar of Laboratory of Applied Geometry and Topology*, HSE University, Moscow, October 18, 2019.

2016 **Duck factory on the two torus**, *International Conference Topological Methods in Dynamics dedicated to 70th birthday of V. Z. Grines*, HSE University, Nizhny Nogvorod, December 11-13, 2016.

2011 **Canard cycles in generic slow-fast systems on the two-torus**, *International Workshop on Hysteresis and Slow-Fast Systems*, Wittenberg, Germany, December 12-14, 2011.

## Teaching Experience

### Online Courses

**Probability theory**, *HSE Data Science online master program at Coursera*.
Course design and lecturing

**Statistics basics**, *HSE Data Science online master program at Coursera*.
Course design and lecturing

**Probability theory, statistics and exploratory data analysis**, *HSE / Coursera*.
Course design and lecturing

### Recent Teaching

**Machine learning**, *HSE, Faculty of Mathematics*.
Course design and lecturing. Bachelor and Master programs

**Ordinary differential equations**, *HSE University/New Economics School (HSE/NES) joint Programme in Economics*.
Course design and lecturing. Bachelor program

**Calculus – 1**, *HSE/NES Programme in Economics*.
Course design and lecturing. Bachelor program

**Data science**, *HSE/NES Programme in Economics*.
Course design and lecturing. Bachelor program

**Linguistic data: quantitative analysis and visualisation**, *HSE, School of Linguistics*.
Course design and lecturing. Master programs. (English)

**Applied differential equations**, *HSE, Faculty of Computer Science*.
Course design, lecturing and exercises. Bachelor program

### Previous Teaching

**More than 20 different courses in mathematics, data science, statistics, game theory and programming**, *HSE, Faculties of Social Sciences, Humanities, Economics, Communication and Design*.
Lectures and practical lessons, Bachelor and Master programs

**Dynamical systems**, *MIPT, Department of Innovations and High Technology*.
Practical lessons

**Ordinary differential equations**, *Math in Moscow program, Independent University of Moscow*.
Lectures and practical lessons. (In English)

## Grants

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| 2013 | **Dynamics of Josephson junction and slow-fast systems**, Research project 12-01-0227, HSE Science Fund. |
| 2013 | **Limit sets in slow-fast systems, picewise translations and skew products**, Grant for young researchers with Ph.D. degree, research project MK-7567.2013.1. |
| 2012 | **Invariant manifolds and asymptotic behaviour of slow-fast mappings**, Research project 11-01-0239, HSE Science Fund. |
| 2012 | **Partially hyperbolic and slow-fast systems: stable effects, bifurcations and applications**, RFBR project 12-01-31241-mol-a. |

## Fellowships & Awards

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| 2012, 2014, 2016 — 2022 | **Best teacher award**.<br>Nominated by students vote |
| 2019 | **Honorary mention**, *HSE, Faculty of Computer Sciences*. |

2013 **Best young mathematician award**, *Dynasty Foundation*.

## Conference Organization

2018 **Member of the organizing committee**, *Real and Complex Dynamical Systems. International conference on the occasion of Prof. Yulij Ilyashenko's 75th birthday*, Independent University of Moscow, HSE University and Steklov Institute.

2014 **Coordinator of the organizing committee**, *International conference "Attractors, Foliations and Limit Cycles"*, Independent University of Moscow, HSE University and Steklov Institute.

2005 **Member of the organizing committee**, *Lyapunov Exponents and Related Topics in Dynamics and Geometry, French-Russian International Conference*, Independent University of Moscow, Laboratoire Jean-Victor Poncelet.

## Service

2022 **Reviewer**, Topology, Algebra, and Geometry in Machine Learning, A Workshop at the 39th International Conference on Machine Learning (ICML 2022).

2016 – 2022 **Member of the academic council**, HSE/NES Programme in Economics.
Supervising mathematical courses

2016 – 2019 **Member of jury**, *Russian National Olympiad on Economics for Highschoolers*.

2021 **Member of jury**, *Data Analysis National Olympiad (Russia)*.