KIRILL ZAKHAROV

Research Scientist, AI/ML Researcher, AI/ML Engineer, Quantitative Researcher

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ResearchGate GitHub Habr Linkedin Google Scholar Orcid

EDUCATION

- PhD student

  Specialization: Artificial Intelligence and Machine Learning
  Thesis: Physics-informed machine learning in the identification of complex systems dynamics.

  ITMO University

  Sept. 2024 – present

- Master of Science in Computer Science

  Specialization: Artificial Intelligence, Financial Technologies, Financial Mathematics
  Thesis: Synthetic transaction generation with differential privacy

  ITMO University

  Sept. 2022 – Aug. 2024

- Bachelor of Science in Applied Mathematics and Computer Science

  Specialization: Artificial Intelligence, Mathematical Modeling, Financial Mathematics
  Thesis: Option pricing based on stochastic differential equations

  Saint Petersburg State University of Finance and Economics

  Sept. 2018 – Aug. 2022

EXPERIENCE

- Research Scientist
  - Conducted research in generative AI for time series, tabular data, transactions and images. Developed new generative models for control generation and time series modeling.
  - Conducted research in physics-informed machine learning and dynamical systems. Developed dynamical models based on Lagrangian mechanics and PINNs.
  - Conducted research in mathematical finance. Developed derivative pricing models based on stochastic differential equations and PINNs.
  - Published scientific articles in academic journals. Participated in international conferences.

  ITMO University, Russia

  Sept. 2022 – present

- Machine Learning Researcher
  - Developed an algorithm for the jump diffusion stochastic processes modelling based on neural stochastic differential equations.
  - Developed a novel evaluation method for synthetic time series based on cross-section distribution of signatures.

  SBER

  Oct. 2023 – Jan. 2024

- Machine Learning Researcher/Engineer
  - Developed a method for the generation of synthetic transactional data with differential privacy.
  - Developed ML algorithm for the deposit duration forecasting.
  - Conducted research in macroeconomic indicators for deposit duration forecasting.

  Bank Saint Petersburg

  Jan. 2023 – Jan. 2024

- Machine Learning Researcher
  - Developed a method for the generation of synthetic financial time series data based on regime clustering.

SBER

Oct. 2022 – Jan. 2023

SKILLS

- **Classical and Advanced Machine Learning**
- **Deep Learning (CV, NLP)**
- **Generative Models**: GANs, Normalizing Flows, Diffusion Models, VAEs, NeuralSDE Flows
- **Physics-Informed AI**: PINNs, NeuralODEs, NeuralSDEs
- **Probability and Statistics**: classical probability, statistical tests, A/B tests, statistical modeling, stochastic calculus, stochastic integrals, stochastic processes, Itô calculus, measure theory in mathematical finance, SDEs
- **Programming Languages**: Python, C, SQL, Wolfram Mathematica, LaTeX
- **Frameworks/Libraries**: Pytorch, Tensorflow, Keras, MLflow, Airflow, NumPy, Pandas, Scikit-learn, OpenCV, NLTK, SciPy, Docker, Git, Spark
- **Dynamical Systems**: ODEs, PDEs in Finance, complex systems dynamics, operator theory, Lagrangian and Hamiltonian mechanics, numerical methods
- **Derivative Pricing**: forwards, options pricing, measure change, binomial model, non-parametric methods, computational finance
- **Academic Writing**: Journal Articles, Conference Proceedings
- **Languages**: Russian, English

SELECTED PUBLICATIONS

[1] Kirill Zakharov. “Multivariate Time Series Modelling with Neural SDE Driven by Jump Diffusion”. In: *International Conference on Computational Science*. Springer. 2024, pp. 213–221.

[2] Kirill Zakharov, Anton Kovantsev, and Alexander Boukhanovsky. “A Dynamic Model of Customers Behavior: Integrating Econophysics and Physics-Informed Neural Networks”. In: *International Conference on Computational Science*. Springer. 2025, pp. 238–252.

[3] Kirill Zakharov, Anton Kovantsev, and Alexander Boukhanovsky. “Coupling of Lagrangian Mechanics and Physics-Informed Neural Networks for the Identification of Migration Dynamics”. In: *Smart Cities* 8.2 (2025), p. 42.

[4] Kirill Zakharov and Elizaveta Stavinova. “Time-dependent differential privacy for enhanced data protection in synthetic transaction generation”. In: *Proceedings of the 2024 13th International Conference on Software and Computer Applications*. 2024, pp. 112–117.

[5] Kirill Zakharov, Elizaveta Stavinova, and Alexander Boukhanovsky. “Synthetic financial time series generation with regime clustering”. In: *J. Adv. Inf. Technol* 14.6 (2023).

[6] Kirill Zakharov, Elizaveta Stavinova, and Anton Lysenko. “TRGAN: A Time-Dependent Generative Adversarial Network for Synthetic Transactional Data Generation”. In: *Proceedings of the 2023 7th International Conference on Software and e-Business*. 2023, pp. 1–8.

CONFERENCES

- International Conference on Computational Science (ICCS), Singapore, 2025
- International Conference on Computational Science (ICCS), Málaga, Spain, 2024
- International Conference on Software and Computer Applications (ICSCA), Bali, Indonesia, 2024
- International Conference on Computer Science and Information Technology (ICCSIT), Paris, France, 2023
- International Conference on Software and e-Business (ICSeB), Osaka, Japan, 2023
- Congress of Young Scientist, Saint Petersburg, Russia, 2025
- Congress of Young Scientist, Saint Petersburg, Russia, 2024
- Congress of Young Scientist, Saint Petersburg, Russia, 2023

COURSES & CERTIFICATES

- Docker, Karpov Courses, 2025
- OpenCV Bootcamp, OpenCV University, 2025

- Computer Vision and Image Processing, ITMO University, OpenEdu, 2023
- AI Frontiers, ITMO University, Saint Petersburg, 2023
- Pricing Options with Mathematical Models, Caltech, Coursera, 2022
- Stochastic Processes, HSE, Coursera, 2022
- Probability Theory, CSC, Stepik, 2022

SELECTED PREPRINTS & OTHER MATERIALS

- Mathematical analysis of break-even points and return bounds for option strategies, 2024, doi: 10.13140/RG.2.2.15945.76649
- Optimisation methods. Theorems, 2023, doi: 10.13140/RG.2.2.36071.01440
- Option pricing modelling based on stochastic differential equations, 2022, doi: 10.13140/RG.2.2.13255.37280
- Spherical and Elliptical distributions, 2021, doi: 10.13140/RG.2.2.15639.24484

COMPETITIONS

- 1th place – ITMO HACK FinTech case, 2022
- 5th place – Rosneft Hackathon, 2022
- 3th place – GPN CUP Data Science, 2021