

Aleksandr Beznosikov

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🔗 Scholar

📄 arXiv

EDUCATION

Moscow Institute of Physics and Technology

PhD in Computer Science and Informatics

Moscow, Russia

Sep 2022 – Present

- GPA – 4/4, 5/5, 9.40/10

Moscow Institute of Physics and Technology

MSc in Applied Mathematics and Physics

Moscow, Russia

Sep 2020 – Jul 2022

- Thesis: "Methods for solving distributed saddle point problems: lower bounds, optimal and practical algorithms",

Advisor: Alexander Gasnikov

- GPA – 3.96/4, 4.96/5, 9.52/10

Moscow Institute of Physics and Technology

BSc in Applied Mathematics and Physics

Moscow, Russia

Sep 2016 – Aug 2020

- Thesis: "Distributed decentralized gradient-free methods for solving non-smooth stochastic convex optimization problems",

Advisor: Alexander Gasnikov

- GPA – 3.99/4, 4.99/5, 9.35/10

WORK EXPERIENCE

MIPT-Yandex Fundamental Research Laboratory

Laboratory head

Moscow, Russia

Jan 2023 – Present

Artificial Intelligence Research Centre, Innopolis University

Leading expert

Innopolis, Russia

Oct 2022 – Present

Laboratory of Mathematical Methods of Optimization, MIPT

Researcher

Moscow, Russia

Sep 2022 – Present

Yandex Research

Research intern

Moscow, Russia

Jul 2021 – Present

Laboratory of Advanced Combinatorics and Network Applications, MIPT

Junior Researcher

Moscow, Russia

Mar 2021 – Present

International Laboratory of SA and HDI, HSE

Research assistant

Moscow, Russia

Feb 2021 – Present

MADE: Big Data Academy Mail.Ru group

Teaching assistant

Moscow, Russia

Feb 2021 – Present

Moscow Institute of Physics and Technology

Teaching assistant at the Department of Mathematical Fundamentals of Control

Moscow, Russia

Sep 2017 – Present

RESEARCH INTERESTS

- Variational Inequalities and Saddle Point Problems

- Distributed Optimization
- Stochastic Optimization
- Machine Learning
- Federated Learning

COMPUTER SKILLS

- Programming Language: **Python, C#, C++, C, SQL**
- **L^AT_EX**
- Operating Systems: **Mac OSX, Linux, Microsoft Windows**

LANGUAGE

- **Russian:** [Mothertongue]
- **English:** [Upper Intermediate]

INTERESTS

- **Basketball**
- **Tennis**

PUBLICATIONS

1. A. Beznosikov, A. Gasnikov
Similarity, Compression and Local Steps: Three Pillars of Efficient Communications for Distributed Variational Inequalities
February 2023, [arxiv.org:2302.07615](https://arxiv.org/abs/2302.07615)
2. A. Gasnikov, D. Dvinskikh, P. Dvurechensky, E. Gorbunov, A. Beznosikov, A. Lobanov
Randomized gradient-free methods in convex optimization
November 2022, [arxiv.org:2211.13566](https://arxiv.org/abs/2211.13566)
3. A. Rogozin, A. Gasnikov, D. Kovalev, A. Beznosikov
Decentralized optimization over time-varying graphs: a survey
October 2022, [arxiv.org:2210.09719](https://arxiv.org/abs/2210.09719)
4. A. Beznosikov, A. Gasnikov
SARAH-based Variance-reduced Algorithm for Stochastic Finite-sum Cocoercive Variational Inequalities
October 2022, [arxiv.org:2210.05994](https://arxiv.org/abs/2210.05994)
5. A. Beznosikov, B. Polyak, E. Gorbunov, D. Kovalev, A. Gasnikov
Smooth Monotone Stochastic Variational Inequalities and Saddle Point Problems – Survey
August 2022, EMS Magazine
6. A. Beznosikov, A. Gasnikov
Compression and Data Similarity: Combination of Two Techniques for Communication-Efficient Solving of Distributed Variational Inequalities
June 2022, OPTIMA 2022 (LNCS series)
7. A. Beznosikov, A. Alanov, D. Kovalev, M. Takáč, A. Gasnikov
On Scaled Methods for Saddle Point Problems
June 2022, [arxiv.org:2206.08303](https://arxiv.org/abs/2206.08303)
8. A. Sadiev, A. Beznosikov, A. Almansoori, D. Kamzolov, R. Tappenden, M. Takáč
Stochastic Gradient Methods with Preconditioned Updates
June 2022, [arxiv.org:2206.00285](https://arxiv.org/abs/2206.00285)

9. D. Kovalev, A. Beznosikov, E. Borodich, A. Gasnikov, G. Scutari
Optimal Gradient Sliding and its Application to Distributed Optimization Under Similarity
May 2022, **NeurIPS 2022**, poster at the main conference
10. A. Beznosikov, E. Gorbunov, H. Berard, N. Loizou
Stochastic Gradient Descent-Ascent: Unified Theory and New Efficient Methods
February 2022, **AISTATS 2023**, [arxiv.org:2202.07262](https://arxiv.org/abs/2202.07262)
11. D. Kovalev, A. Beznosikov, A. Sadiev, M. Persiiianov, P. Richtárik, A. Gasnikov
Optimal Algorithms for Decentralized Stochastic Variational Inequalities
February 2022, **NeurIPS 2022**, poster at the main conference
12. A. Gasnikov, A. Novitskii, V. Novitskii, F. Abdukhakimov, D. Kamzolov, A. Beznosikov, M. Takáč, P. Dvurechensky, B. Gu
The Power of First-Order Smooth Optimization for Black-Box Non-Smooth Problems
January 2022, **ICML 2022**, short talk at the main conference
13. A. Beznosikov, A. Gasnikov, K. Zainulina, A. Maslovskiy, D. Pasechnyuk
A Unified Analysis of Variational Inequality Methods: Variance Reduction, Sampling, Quantization and Coordinate Descent
January 2022, [arxiv.org:2201.12206](https://arxiv.org/abs/2201.12206)
14. A. Beznosikov, M. Takac
Random-reshuffled SARAH does not need a full gradient computations
November 2021, **NeurIPS 2021**, poster at workshop on Optimization for Machine Learning
15. A. Beznosikov, P. Richtárik, M. Diskin, M. Ryabinin, A. Gasnikov
Distributed Methods with Compressed Communication for Solving Variational Inequalities, with Theoretical Guarantees
October 2021, **NeurIPS 2022**, poster at the main conference
16. A. Beznosikov, G. Scutari, A. Rogozin, A. Gasnikov
Distributed Saddle-Point Problems Under Similarity
July 2021, **NeurIPS 2021**, poster at the main conference
17. A. Sadiev, E. Borodich, A. Beznosikov, D. Dvinskikh, M. Takac, A. Gasnikov
Decentralized Personalized Federated Learning: Lower Bounds and Optimal Algorithm for All Personalization Modes
July 2021, **EURO Journal on Computational Optimization**
NeurIPS 2021, spotlight at workshop on Optimization for Machine Learning
18. A. Beznosikov, A. Rogozin, D. Kovalev, A. Gasnikov
Near-Optimal Decentralized Algorithms for Saddle Point Problems over Time-Varying Networks
July 2021, OPTIMA 2021 (LNCS series)
19. I. Stepanov, A. Voronov, A. Beznosikov, A. Gasnikov
One-Point Gradient-Free Methods for Composite Optimization with Applications to Distributed Optimization
July 2021, [arXiv:2107.05951](https://arxiv.org/abs/2107.05951)
20. A. Beznosikov, P. Dvurechensky, A. Koloskova, V. Samokhin, S. Stich, A. Gasnikov
Decentralized Local Stochastic Extra-Gradient for Variational Inequalities
June 2021, **NeurIPS 2022**, poster at the main conference
21. E. Borodich, A. Beznosikov, A. Sadiev, V. Sushko, N. Savelyev, M. Takac, A. Gasnikov
Decentralized Personalized Federated Min-Max Problems
June 2021, **NeurIPS 2021**, poster at workshop on New Frontiers in Federated Learning: Privacy, Fairness, Robustness, Personalization and Data Ownership
22. E. Gladin, A. Sadiev, A. Gasnikov, P. Dvurechensky, A. Beznosikov, M. Alkousa
Solving smooth min-min and min-max problems by mixed oracle algorithms
March 2021, MOTOR 2021 (CCIS series)

23. A. Beznosikov, V. Novitskii, A. Gasnikov
One-Point Gradient-Free Methods for Smooth and Non-Smooth Saddle-Point Problems
March 2021, MOTOR 2021 (LNCS series)
24. A. Beznosikov, V. Samokhin, A. Gasnikov
Distributed Saddle-Point Problems: Lower Bounds, Optimal and Robust Algorithms
February 2021, Communication Efficient Distributed Optimization Workshop, poster
25. A. Rogozin, A. Beznosikov, D. Dvinskikh, D. Kovalev, P. Dvurechensky, A. Gasnikov
Decentralized Distributed Optimization for Saddle Point Problems
February 2021, arXiv:2102.07758
26. E. Gorbunov, A. Rogozin, A. Beznosikov, D. Dvinskikh, A. Gasnikov
Recent theoretical advances in decentralized distributed convex optimization
November 2020, High Dimensional Optimization and Probability Journal
27. A. Sadiev, A. Beznosikov, P. Dvurechensky, A. Gasnikov
Zeroth-Order Algorithms for Smooth Saddle-Point Problems
September 2020, MOTOR 2021 (CCIS series)
28. A. Bazarova, A. Beznosikov, A. Gasnikov
Linearly Convergent Gradient-Free Methods for Minimization of Symmetric Parabolic Approximation
September 2020, Computer Research and Modeling
29. A. Beznosikov, A. Sadiev, A. Gasnikov
Gradient-Free Methods for Saddle-Point Problem
May 2020, MOTOR 2020 (CCIS series)
30. A. Beznosikov, S. Horváth, P. Richtárik, M. Safaryan
On Biased Compression for Distributed Learning
February 2020, **NeurIPS 2020**, oral talk at workshop on Scalability, Privacy, and Security in Federated Learning
31. A. Beznosikov, E. Gorbunov, A. Gasnikov
Derivative-Free Method For Composite Optimization With Applications To Decentralized Distributed Optimization
November 2019, **IFAC World Congress 2020** (IFAC-PapersOnline)

TALKS

- January 2023, International conference on the occasion of Boris Mirkin's 80th birthday, Moscow, Russia – 15 min oral talk
- December 2022, NeurIPS 2022, main conference, online – 4 posters
- November 2022, Fall into ML workshop 2022, Moscow, Russia – 15 min oral talk
- November 2022, Mathematics of Big Data (MIPT course), Moscow, Russia – 2 hours invited oral talk
- September 2022, International Conference Optimization and Applications (OPTIMA 2022), Petrovac, Montenegro (online) – 15 min oral talk
- September 2022, All-Russian Optimization Seminar, Moscow, Russia – 1,5 hour oral talk
- December 2021, NeurIPS 2021, workshop on Optimization for Machine Learning, online – poster
- December 2021, NeurIPS 2021, main conference, online – poster
- November 2021, Mohamed bin Zayed University of Artificial Intelligence, Abu Dhabi, UAE – 2 hour lecture
- September 2021, International Conference Optimization and Applications (OPTIMA 2021), Petrovac, Montenegro (online) – 15 min oral talk
- July 2021 Modern Methods of Information Theory, Optimization and Control (summer school), Sochi, Russia – 1 hour lecture
- June 2021 All-Russian Optimization Seminar, Moscow, Russia – 45 min oral talk

- June 2021 Control, Information and Optimization Summer School, Moscow, Russia – 1,5 hour lecture
- June 2021 Moscow Conference on Combinatorics and Applications, Moscow, Russia (online) – 30 min oral talk
- April 2021, MADE: Big Data Academy Mail.Ru group, Moscow, Russia (online) – 3 hour lecture
- April 2021, Communication Efficient Distributed Optimization Workshop, (online) – poster session
- July 2020, Mathematical Optimization Theory and Operations Research (MOTOR 2020), Novosibirsk, Russia (online) – 15 min oral talk
- July 2020, 21st IFAC World Congress 2020, Berlin, Germany (online) – video and poster
- December 2019, Quasilinear Equations, Inverse Problems and Their Applications 2019, Moscow, Russia – 15 min oral talk
- November 2019, The 62th MIPT Conference – 15 min oral talk, **winner**
- November 2017, The 60th MIPT Conference, Moscow, Russia – 15 min oral talk, **winner**

RESEARCH VISITS

- March – May 2023, MBZUAI, Abu Dhabi, United Arab Emirates (worked with Martin Takac)
- September 2022 – January 2023, Université de Montréal, Montreal, Canada (worked with Gauthier Gidel)
- October – November 2021, MBZUAI, Abu Dhabi, United Arab Emirates (worked with Martin Takac)
- July – August 2021, Sirius University of Science and Technology, Sochi, Russia
- August – August 2020, Sirius University of Science and Technology, Sochi, Russia
- January – February 2020, Visual Computing Center, KAUST, Thuwal, Saudi Arabia (worked with Peter Richtárik)

SCHOLARSHIPS, HONORS AND AWARDS

- | University | <i>2016 - Present</i> |
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| ○ Spring 2022-2023 1st degree personal scholarship for contributions to the development of numerical optimization methods | |
| ○ Fall 2022-2023 1st degree personal scholarship for contributions to the development of numerical optimization methods | |
| ○ Fall 2022-2023 N.N. Moiseyev and O. M. Bilotserkovsky personal scholarship | |
| ○ Spring 2021-2022 1st degree personal scholarship for contributions to the development of numerical optimization methods | |
| ○ Spring 2021-2022 Increased State Academic Scholarship for 4 year bachelor and master students at MIPT | |
| ○ Spring 2021-2022 N.N. Moiseyev and O. M. Bilotserkovsky personal scholarship | |
| ○ Fall 2021-2022 1st degree personal scholarship for contributions to the development of numerical optimization methods | |
| ○ Fall 2021-2022 Increased State Academic Scholarship for 4 year bachelor and master students at MIPT | |
| ○ Spring 2020-2021 1st degree personal scholarship for contributions to the development of numerical optimization methods | |
| ○ Spring 2020-2021 Increased State Academic Scholarship for 4 year bachelor and master students at MIPT | |
| ○ Fall 2020-2021 Increased State Academic Scholarship for 4 year bachelor and master students at MIPT | |
| ○ 2020 Gazprom Bank personal scholarship | |
| ○ 2020 Moscow region government scholarship | |
| ○ 2020 Personal merit scholarship at MIPT | |
| ○ Spring 2019-2020 Increased State Academic Scholarship for 4 year bachelor and master students at MIPT | |
| ○ Fall 2019-2020 Increased State Academic Scholarship for 4 year bachelor and master students at MIPT | |
| ○ Spring 2018-2019 Increased State Academic Scholarship for 4 year bachelor and master students at MIPT | |
| ○ Fall 2018-2019 Author of problems and organizer of the student olympiad in discrete mathematics | |
| ○ 2017: First Prize at MIPT's Team Mathematical Tournament | |
| ○ 2017-2019: Abramov scholarship for 1-3 year bachelor students with the best grades at MIPT | |

School

2016 and earlier

- 2015: Silver medal in IEPHO (International Experimental Physics Olympiad)
- 2014-2015: Russian President's Scholarship, for high school student
- 2015: Prize-Winner, All-Russian School Physics Olympiad, Final Round
- 2014: Prize-Winner, All-Russian School Physics Olympiad, Final Round
- 2014-2015: Russian President's Scholarship, for high school student
- 2015-2016: Winner, All-Russian School Programming Olympiad, Region Round
- 2014-2016: Winner, All-Russian School Physics Olympiad, Region Round
- 2014-2016: Winner, All-Russian School Maths Olympiad, Region Round

TEACHING

Big Data Academy VK group

Moscow, Russia

Teaching assistant

Feb 2023 - Present

- Spring 2023: Optimization in Machine Learning

MADE: Big Data Academy Mail.Ru group

Moscow, Russia

Teaching assistant

Feb 2021 - June 2022

- Spring 2022: Optimization in Machine Learning

- Spring 2021: Optimization in Machine Learning

Moscow Institute of Physics and Technology

Moscow, Russia

Teaching assistant at the Department of Mathematical Fundamentals of Control

Sep 2017 - Present

- Spring 2023: Numerical optimization
- Spring 2023: Stochastic process
- Fall 2022: Probability theory
- Spring 2022: Stochastic process
- Fall 2021: Probability theory
- Spring 2021: Stochastic process
- Fall 2020: Probability theory
- Fall 2020: Discrete analysis
- Spring 2020: Stochastic process
- Fall 2019: Probability theory
- Fall 2019: Discrete analysis
- Fall 2018: Discrete analysis
- Fall 2018: Databases
- Fall 2017: Databases

Summer school in Physics and Mathematics Lyceum

Syktyvkar, Russia

Director, Head of teaching staff

Aug 2018, Aug 2019

- Summer school for gifted children from provincial towns and villages

REVIEWING

- Automatica: 1 paper in 2021.
- IEEE Transactions on Information Theory: 1 paper in 2021.
- AISTATS: 3 papers in 2022, 4 papers in 2023
- SIOPT: 1 paper in 2022
- NeurIPS: 5 papers in 2022 (top reviewer)