Aleksandr Beznosikov

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Scholar arXiv

EDUCATION

Moscow Institute of Physics and Technology — **Moscow, Russia**
PhD in Computer Science and Informatics — *Sep 2022 – Present*

- GPA – **4/4, 5/5, 9.40/10**

Moscow Institute of Physics and Technology — **Moscow, Russia**
MSc in Applied Mathematics and Physics — *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 — **Moscow, Russia**
BSc in Applied Mathematics and Physics — *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 — **Moscow, Russia**
Laboratory head — *Jan 2023 – Present*

Artificial Intelligence Research Centre, Innopolis University — **Innopolis, Russia**
Leading expert — *Oct 2022 – Present*

Laboratory of Mathematical Methods of Optimization, MIPT — **Moscow, Russia**
Researcher — *Sep 2022 – Present*

Yandex Research — **Moscow, Russia**
Research intern — *Jul 2021 – Present*

Laboratory of Advanced Combinatorics and Network Applications, MIPT — **Moscow, Russia**
Junior Researcher — *Mar 2021 – Present*

International Laboratory of SA and HDI, HSE — **Moscow, Russia**
Research assistant — *Feb 2021 – Present*

MADE: Big Data Academy Mail.Ru group — **Moscow, Russia**
Teaching assistant — *Feb 2021 - Present*

Moscow Institute of Physics and Technology — **Moscow, Russia**
Teaching assistant at the Department of Mathematical Fundamentals of Control — *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**
- LaTeX
- 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
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
3. A. Rogozin, A. Gasnikov, D. Kovalev, A. Beznosikov
   Decentralized optimization over time-varying graphs: a survey
   October 2022, arxiv.org: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
5. A. Beznosikov, B. Polyak, E. Gorbunov, D. Kovalev, A. Gasnikov
   Smooth Monotone Stochastic Variational Inequalities and Saddle Point Problems – Survey
   August 2022, arxiv.org:2208.13592
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
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

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**, arxiv.org:2205.15136
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
11. D. Kovalev, A. Beznosikov, A. Sadiev, M. Persiianov, P. Richtárik, A. Gasnikov
    Optimal Algorithms for Decentralized Stochastic Variational Inequalities
    February 2022, **NeurIPS 2022**, arxiv.org:2202.02771
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
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**, arxiv.org:2110.03313
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
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**, arXiv:2106.08315
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

- 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 *2016 - Present*

- **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)