Aleksandr Beznosikov

No 9, Institute Lane, Dolgoprudny, Russia

🏠 anbeznosikov.github.io

✉ anbeznosikov@gmail.com   ✉ beznosikov.an@phystech.edu

✈ @abeznosikov

G Scholar   📖 arXiv

EDUCATION

Moscow Institute of Physics and Technology   **Moscow, Russia**
PhD in Computer Science and Informatics   *Sep 2022 – Aug 2023*

○ Thesis: "Gradient-Free Methods for Saddle-Point Problems and Beyond",
  Advisor: Alexander Gasnikov
○ GPA – **4/4, 5/5, 9.64/10**

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

Sber AI Lab, Sber   **Moscow, Russia**
Research assistant   *Nov 2023 – Present*

Department of Mathematical Methods of Forecasting, MSU   **Moscow, Russia**
Mathematician   *Oct 2023 – Present*

Center of Artificial Intelligence Technology, Skoltech   **Moscow, Russia**
Research engineer   *Aug 2023 – Present*

Department of Discrete Mathematics, MIPT   **Moscow, Russia**
Lecturer   *Aug 2023 – Present*

Department of Data Analysis, MIPT   **Moscow, Russia**
Teaching assistant   *Jul 2023 – Present*

Laboratory 10, IITP RAS   **Moscow, Russia**
Researcher   *Jun 2023 – Present*

Machine Learning Department, MBZUAI   **Abu Dhabi, United Arab Emirates**
Research assistant   *Mar 2023 – Present*

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**
Researcher	*Mar 2021 – Present*
International Laboratory of SA and HDI, HSE	**Moscow, Russia**
Research assistant	*Feb 2021 – Dec 2022*
MADE: Big Data Academy Mail.Ru group	**Moscow, Russia**
Teaching assistant	*Feb 2021 - Present*
Department of Mathematical Fundamentals of Control, MIPT	**Moscow, Russia**
Senior instructor	*Sep 2017 – Present*

RESEARCH INTERESTS

- Variational Inequalities and Saddle Point Problems
- Federated Learning
- Distributed Optimization
- Stochastic Optimization
- Machine 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. M. Rudakov, A. Beznosikov, Y. Kholodov, A. Gasnikov
   Activations and gradients compression for model-parallel training
   December 2023, Doklady Rossijskoj akademii nauk. Matematika, informatika, processy upravlenia,
   AI Journey best paper award
2. D. Medyakov, G. Molodtsov, A. Beznosikov, A. Gasnikov
   Optimal data splitting in distributed optimization for machine learning
   December 2023, Doklady Rossijskoj akademii nauk. Matematika, informatika, processy upravlenia
3. A. Pichugin, M. Pechin, A. Beznosikov, A. Savchenko, A. Gasnikov
   Optimal analysis of method with batching for monotone stochastic finite-sum variational inequalities

December 2023, Doklady Rossijskoj akademii nauk. Matematika, informatika, processy upravlenia

4. S. Ablaev, A. Beznosikov, A. Gasnikov, D. Dvinskikh, A. Lobanov, S. Puchinin, F. Stonyakin
About some works of Boris Polyak on convergence of gradient methods and their development
November 2023, arxiv.org:2311.16743

5. A. Beznosikov, D. Dvinskikh, A. Semenov, A. Gasnikov
Bregman Proximal Method for Efficient Communications under Similarity
November 2023, arxiv.org:2311.06953

6. A. Ustimenko, A. Beznosikov
Ito Diffusion Approximation of Universal Ito Chains for Sampling, Optimization and Boosting
October 2023, arxiv.org:2310.06081

7. S. Tkachenko, A. Andreev, A. Beznosikov, A. Gasnikov
Real Acceleration of Communication Process in Distributed Algorithms with Compression
September 2023, OPTIMA 2023 (LNCS series)

8. E. Borodich, G. Kormakov, D. Kovalev, A. Beznosikov, A. Gasnikov
Optimal Algorithm with Complexity Separation for Strongly Convex-Strongly Concave Composite
Saddle Point Problems
July 2023, arxiv.org:2307.12946

9. D. Metelev, A. Beznosikov, A. Rogozin, A. Gasnikov, A. Proskurnikov
Decentralized Optimization Over Slowly Time-Varying Graphs: Algorithms and Lower Bounds
July 2023, Computational Management Science

10. A. Lobanov, A. Veprikov, G. Konin, A. Beznosikov, A. Gasnikov, D. Kovalev
Non-Smooth Setting of Stochastic Decentralized Convex Optimization Problem Over Time-Varying
Graphs
July 2023, Computational Management Science

11. A. Beznosikov, S. Samsonov, M. Sheshukova, A. Gasnikov, A. Naumov, E. Moulines
First Order Methods with Markovian Noise: from Acceleration to Variational Inequalities
May 2023, **NeurIPS 2023**, poster at the main conference

12. A. Beznosikov, D. Dobre, G. Gidel
Sarah Frank-Wolfe: Methods for Constrained Optimization with Best Rates and Practical Features
April 2023, arxiv.org:2304.11737

13. A. Beznosikov, M. Takac, A. Gasnikov
Similarity, Compression and Local Steps: Three Pillars of Efficient Communications for Distributed
Variational Inequalities
February 2023, **NeurIPS 2023**, poster at the main conference

14. 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

15. A. Rogozin, A. Gasnikov, D. Kovalev, A. Beznosikov
Decentralized optimization over time-varying graphs: a survey
October 2022, arxiv.org:2210.09719

16. A. Beznosikov, A. Gasnikov
SARAH-based Variance-reduced Algorithm for Stochastic Finite-sum Cocoercive Variational Inequalities
October 2022, Springer Optimization and Its Applications

17. A. Beznosikov, B. Polyak, E. Gorbunov, D. Kovalev, A. Gasnikov
Smooth Monotone Stochastic Variational Inequalities and Saddle Point Problems – Survey
August 2022, EMS Magazine

18. 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)

19. A. Beznosikov, A. Alanov, D. Kovalev, M. Takáč, A. Gasnikov
On Scaled Methods for Saddle Point Problems
June 2022, arxiv.org:2206.08303

20. A. Sadiev, A. Beznosikov, A. Almansoori, D. Kamzolov, R. Tappenden, M. Takáč
Stochastic Gradient Methods with Preconditioned Updates
June 2022, arxiv.org:2206.00285

21. 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

22. A. Beznosikov, E. Gorbunov, H. Berard, N. Loizou
Stochastic Gradient Descent-Ascent: Unified Theory and New Efficient Methods
February 2022, **AISTATS 2023**, poster at the main conference

23. D. Kovalev, A. Beznosikov, A. Sadiev, M. Persiianov, P. Richtárik, A. Gasnikov
Optimal Algorithms for Decentralized Stochastic Variational Inequalities
February 2022, **NeurIPS 2022**, poster at the main conference

24. 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

25. 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, Computational Mathematics and Mathematical Physics

26. A. Beznosikov, M. Takac
Random-reshuffled SARAH does not need a full gradient computations
November 2021, **Optimization Letters**
NeurIPS 2021, poster at workshop on Optimization for Machine Learning

27. 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

28. A. Beznosikov, G. Scutari, A. Rogozin, A. Gasnikov
Distributed Saddle-Point Problems Under Similarity
July 2021, **NeurIPS 2021**, poster at the main conference

29. 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

30. 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)

31. 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

32. 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

33. 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

34. 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)

35. 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)

36. A. Beznosikov, V. Samokhin, A. Gasnikov
Distributed Saddle-Point Problems: Lower Bounds, Optimal and Robust Algorithms
February 2021, Communication Efficient Distributed Optimization Workshop, poster

37. A. Rogozin, A. Beznosikov, D. Dvinskikh, D. Kovalev, P. Dvurechensky, A. Gasnikov
Decentralized Distributed Optimization for Saddle Point Problems
February 2021, arXiv:2102.07758

38. 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

39. A. Sadiev, A. Beznosikov, P. Dvurechensky, A. Gasnikov
Zeroth-Order Algorithms for Smooth Saddle-Point Problems
September 2020, MOTOR 2021 (CCIS series)

40. A. Bazarova, A. Beznosikov, A. Gasnikov
Linearly Convergent Gradient-Free Methods for Minimization of Symmetric Parabolic Approximation
September 2020, Computer Research and Modeling

41. A. Beznosikov, A. Sadiev, A. Gasnikov
Gradient-Free Methods for Saddle-Point Problem
May 2020, MOTOR 2020 (CCIS series)

42. A. Beznosikov, S. Horváth, P. Richtárik, M. Safaryan
On Biased Compression for Distributed Learning
February 2020, **Journal of Machine Learning Research**
NeurIPS 2020, oral talk at workshop on Scalability, Privacy, and Security in Federated Learning

43. 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, Regular seminar of Laboratory of Algorithms and Technologies for Networks Analysis, Nizhny Novgorod, Russia – 1,5 hour oral talk
- December 2023, NeurIPS 2023, main conference, online – 4 posters
- November 2023, Mathematics of Big Data (MIPT course), Moscow, Russia – 2 hours invited oral talk
- August 2023, Summer school of machine learning "SMILES", Altai, Russia – 3 hour oral talk
- July 2023, Traditional youth summer school "Control, information and optimization", Nizhny Novgorod, Russia – 1 hour oral talk

- June 2023, Omsk State Technical University, Omsk, Russia – 1 hour oral talk
- April 2023, All-Russian Optimization Seminar, Moscow, Russia – 1,5 hour oral talk
- April 2023, Data Fusion Conference, Moscow, Russia – 15 min oral talk
- 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

- October – November 2023, MBZUAI, Abu Dhabi, United Arab Emirates (worked with Martin Takac)
- 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)

TEACHING

Skoltech University   **Moscow, Russia**
Lecturer   *Nov 2023 - Present*
○ Fall 2023: Optimization in Machine Learning

Innopolis University   **Innopolis, Russia**
Lecturer   *Sep 2023 - Present*
○ Fall 2023: Optimization in Machine Learning

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**
Senior instructor   *Sep 2017 - Present*
○ Fall 2023: Numerical optimization (lecturer)
○ Fall 2023: Probability theory
○ 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

SCHOLARSHIPS, HONORS AND AWARDS

Researcher   *2023 - Present*
○ **Fall 2023** AI Leaders in the nomination "Researcher": video
○ **Fall 2023** Yandex ML Prize in the nomination "Yandex Researcher"
○ **Fall 2023** AI Journey best paper award: video

University   *2016 - 2023*

- **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

GRANTS

- **2023-2025**: Russian Science Foundation, project number 23-11- 00229 – main executor
- **2021-2024**: Russian Science Foundation, project number 21-71-30005 – executor
- **2020-2021**: Russian Foundation for Basic Research, project number 19-31-51001 "Scientific mentoring" – executor

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), 6 papers in 2023
- JOTA: 1 paper in 2023