

# Eduard GORBUNOV

## PERSONAL DATA

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PLACE AND DATE OF BIRTH: Rybinsk, Russia | 22 November 1996  
EMAIL: [eduard.gorbunov@mbzuai.ac.ae](mailto:eduard.gorbunov@mbzuai.ac.ae)  
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DBLP: <https://dblp.org/pid/215/5512.html>

## RESEARCH INTERESTS

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Optimization, Machine Learning, Federated Learning, Variational Inequalities, Derivative-Free Optimization, Randomized Algorithms

## WORK EXPERIENCE

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APRIL 2024 – NOW	Research Scientist at the <b>ML department</b> , <a href="#">MBZUAI</a> , Abu Dhabi, UAE (hosted by <a href="#">Samuel Horváth</a> and <a href="#">Martin Takác</a> )
SEPTEMBER 2022 – MARCH 2024	Postdoctoral Fellow at the <b>ML department</b> , <a href="#">MBZUAI</a> , Abu Dhabi, UAE (hosted by <a href="#">Samuel Horváth</a> and <a href="#">Martin Takác</a> )
MAY 2020 – AUGUST 2022	Junior Researcher at <b>Laboratory of Advanced Combinatorics and Network Applications</b> , <a href="#">MIPT</a> , Moscow
FEBRUARY 2022 – MAY 2022	Research Consultant at <a href="#">Mila</a> , Montreal (in the group of <a href="#">Gauthier Gidel</a> )
SEPTEMBER 2020 – JANUARY 2022	Junior Researcher at <b>Yandex.Research-MIPT Laboratory</b> , Moscow
MAY 2020 – DECEMBER 2021	Research Assistant at <b>International Laboratory of Stochastic Algorithms and High-Dimensional Inference</b> , <a href="#">HSE</a> , Moscow
NOVEMBER 2019 – APRIL 2020	Junior Researcher at <a href="#">IITP RAS</a> , Moscow
FEBRUARY 2020 – DECEMBER 2020	Junior Researcher at <b>Joint Research Laboratory of Applied Mathematics</b> , <a href="#">RANEPa-MIPT</a> , Moscow
FEBRUARY 2020 – DECEMBER 2020	Junior Researcher at <b>Laboratory of Numerical Methods of Applied Structural Optimization</b> , <a href="#">MIPT</a> , Moscow
AUGUST 2019 – JULY 2019	Researcher at <b>Huawei-MIPT</b> group, Moscow (research, Python)
MAY 2019 – AUGUST 2019	Intern at <b>Huawei Media Lab</b> , Moscow (research, C++)
AUGUST 2017 – OCTOBER 2019	Researcher at <a href="#">Peter Richtárik's Group</a> , <a href="#">MIPT</a> , Moscow

## EDUCATION

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- SEPTEMBER 2020 – DECEMBER 2021    PhD in COMPUTER SCIENCE  
**Moscow Institute of Physics and Technology**, Moscow  
Thesis: “[Distributed and Stochastic Optimization Methods with Gradient Compression and Local Steps](#)”  
Advisors: [Alexander GASNIKOV](#) and [Peter RICHTÁRIK](#)  
LINKS: [slides](#) and [video](#) of the defense
- SEPTEMBER 2018 – JULY 2020    Master of Science in APPLIED MATHEMATICS  
**Moscow Institute of Physics and Technology**, Moscow  
Thesis: “[Derivative-free and stochastic optimization methods, decentralized distributed optimization](#)”  
Advisor: [Alexander GASNIKOV](#)
- SEPTEMBER 2014 – JULY 2018    Bachelor of Science in APPLIED MATHEMATICS  
**Moscow Institute of Physics and Technology**, Moscow  
Thesis: “[Accelerated Directional Searches and Gradient-Free Methods with non-Euclidean prox-structure](#)”  
Advisor: [Alexander GASNIKOV](#)

## RESEARCH VISITS AND INTERNSHIPS

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- **8 June 2021 – 30 September 2021**, [Mila](#), Université de Montréal. Internship in the group of [Gauthier Gidel](#)
- **1 September 2020 – 28 February 2021**, Visual Computing Center, KAUST, Thuwal, Saudi Arabia. I remotely worked in the group of [P. Richtárik](#)
- **2 February – 31 March 2020**, Visual Computing Center, KAUST, Thuwal, Saudi Arabia (worked with [P. Richtárik](#))
- **6 October – 26 October 2019**, [SIERRA](#), [INRIA](#), Paris, France (worked with [A. Taylor](#))
- **13 January – 24 February 2019**, Visual Computing Center, KAUST, Thuwal, Saudi Arabia (worked with [P. Richtárik](#))
- **14 January – 8 February 2018**, Visual Computing Center, KAUST, Thuwal, Saudi Arabia (worked with [P. Richtárik](#))

## LANGUAGES

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RUSSIAN:    Mothertongue  
ENGLISH:    Advanced

## COMPUTER SKILLS

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Operating Systems:    MICROSOFT WINDOWS, LINUX, MAC OS  
Programming Languages:    PYTHON,  $\text{\LaTeX}$ , C, C++

## SCHOLARSHIPS, HONORS AND AWARDS

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- **October 2022**. I got “[outstanding reviewer award](#)” at [NeurIPS 2022](#) and a free registration to the conference

- **October 2021.** I got “outstanding reviewer award” at ICML 2022 and a free registration to the conference
- **October 2021.** I got “outstanding reviewer award” at NeurIPS 2021 (top 8% of reviewers) and a free registration to the conference
- **September 2021 - January 2021.** A. M. Raigorodskii Scholarship for Contribution to the Development of Numerical Optimization Methods (main scholarship)
- **July 2021.** I was recognized as one of the top 10% of reviewers for ICML 2021 and got a free registration to the conference
- **19 March 2021.** I was recognized as an “outstanding reviewer” for ICLR 2021 and got a free registration to the conference
- **February 2021 - June 2021.** A. M. Raigorodskii Scholarship for Contribution to the Development of Numerical Optimization Methods (main scholarship)
- **21 October, 2020.** I was recognized as one of the top 10% best reviewers for NeurIPS 2020 and got free registration to the conference
- **February 2020 - June 2020.** Increased State Academic Scholarship for 4 year bachelor and master students at MIPT for scientific achievements (14,000 Russian rubles per month instead of the regular scholarship)
- **15 January, 2020.** Huawei scholarship for bachelor and master students at MIPT (125,000 Russian rubles)
- **September 2019 - January 2020.** Increased State Academic Scholarship for 4 year bachelor and master students at MIPT for scientific achievements (10,000 Russian rubles per month in addition to the regular scholarship)
- **10 April, 2019.** The Ilya Segalovich Award – Yandex scientific scholarship, highly selective: 9 winners from Russia, Belarus and Kazakhstan (350,000 Russian rubles, internship offer at Yandex.Research, travel grant to attend one international conference; news about award: <https://nplus1.ru/news/2019/04/10/ya-awards>)
- **February 2019 - June 2019.** Increased State Academic Scholarship for 4 year bachelor and master students at MIPT for scientific achievements (10,000 Russian rubles per month in addition to the regular scholarship)
- **September 2018 - January 2019.** Increased State Academic Scholarship for 4 year bachelor and master students at MIPT for scientific achievements (10,000 Russian rubles per month in addition to the regular scholarship)
- **February 2018 - June 2018.** Increased State Academic Scholarship for 4 year bachelor and master students at MIPT for scientific achievements (10,000 Russian rubles per month in addition to the regular scholarship)
- **September 2017 - January 2018.** Increased State Academic Scholarship for 4 year bachelor and master students at MIPT for scientific achievements (10,000 Russian rubles per month in addition to the regular scholarship)
- **November 2017.** Diploma of winner of the Section of Information Transmission Problems, Data Analysis and Optimization at 60th Scientific Conference of MIPT
- **May 2017.** Third Prize at MIPT’s Student Olympiad in Mathematics
- **March 2017.** First Prize at MIPT’s Team Mathematical Tournament
- **September 2016 - June 2017.** Abramov scholarship for 1-3 year bachelor students with the best grades at MIPT (12,000 Russian rubles per month)
- **December 2015.** Third Prize at MIPT’s Student Olympiad in Mathematics

- **February 2015 - June 2015.** Abramov scholarship for 1-3 year bachelor students with the best grades at MIPT (12,000 Russian rubles per month)
- **April 2014.** Participant of Final Round of All-Russian Mathematical Olympiad ([scored points: 28 out of 56, 59th place](#))

## SUPERVISION & MENTORING

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I was supervising/mentoring the work of the following students/interns/research assistants on the listed projects.

- [Sayantan Choudhury](#), [Nazarii Tupitsa](#). Project on scale-invariant version of AdaGrad – led to the preprint: Remove that Square Root: A New Efficient Scale-Invariant Version of AdaGrad, [arXiv:2403.02648](#)
- [Nazarii Tupitsa](#). Project on Federated Learning – led to the preprint: Federated Learning Can Find Friends That Are Beneficial, [arXiv:2402.05050](#)
- [Nickolay Kutuzov](#). Supervision of the work on numerical experiments for a project on high-probability convergence under heavy-tailed noise – led to the paper accepted to [AISTATS 2024](#): Breaking the Heavy-Tailed Noise Barrier in Stochastic Optimization Problems, [arXiv:2311.04161](#)
- [Grigory Malinovsky](#). Project on Byzantine-robust learning with partial participation – led to the preprint: Byzantine Robustness and Partial Participation Can Be Achieved Simultaneously: Just Clip Gradient Differences, [arXiv:2311.14127](#)
- [Nikita Kornilov](#). Project on relative error in gradients – led to the preprint: Intermediate Gradient Methods with Relative Inexactness, [arXiv:2310.00506](#)
- [Nazarii Tupitsa](#), [Abdulla Jasem Almansoori](#), [Yanlin Wu](#). Project on Byzantine-robust methods for distributed variational inequalities – led to the paper accepted to [NeurIPS 2023](#): Byzantine-Tolerant Methods for Distributed Variational Inequalities, [arXiv:2311.04611](#)
- [Nikita Fedin](#). Project on Byzantine-robust learning with variance reduction – led to the paper accepted to [MOTOR 2023](#): Byzantine-Robust Loopless Stochastic Variance-Reduced Gradient, [arXiv:2303.04560](#)
- [Abdurakhmon Sadiev](#)
  1. Project on high-probability convergence without bounded variance assumption – led to the paper accepted to [ICML 2023](#): High-Probability Bounds for Stochastic Optimization and Variational Inequalities: the Case of Unbounded Variance, [arXiv:2302.00999](#)
  2. Project on high-probability convergence for composite and distributed optimization problems – led to the paper accepted to [ICML 2024](#): High-Probability Convergence for Composite and Distributed Stochastic Minimization and Variational Inequalities with Heavy-Tailed Noise, [arXiv:2310.01860](#)
- [Konstantin Burlachenko](#). Supervision of the work on numerical experiments for a project on distributed non-convex optimization with unbiased compression – led to the paper accepted to [ICML 2021](#): MARINA: Faster Non-Convex Distributed Learning with Compression, [arXiv:2102.07845](#)
- [Dmitry Makarenko](#). Supervision of the work on numerical experiments for a project on distributed optimization with biased compression – led to the paper accepted as a [spot-light](#) to [NeurIPS 2020](#): Linearly Converging Error Compensated SGD, [arXiv:2010.12292](#)
- [Aleksandr Beznosikov](#). Project on zeroth-order composite optimization – led to the paper accepted to [IFAC 2020](#): Derivative-Free Method For Decentralized Distributed Non-Smooth Optimization, [arXiv:1911.10645](#)

## BOOKS

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1. [A. Gasnikov](#), [E. Gorbunov](#), [S. Guz](#), E. Chernousova, [M. Shirobokov](#), [E. Shulgin](#). **Lecture Notes on Stochastic Processes**, [arXiv:1907.01060](#) (June 2019)

## PUBLICATIONS

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54. [A. Agafonov](#), [P. Ostroukhov](#), R. Mozhaev, [K. Yakovlev](#), [E. Gorbunov](#), [M. Takác](#), [A. Gasnikov](#), [D. Kamzolov](#). **Exploring Jacobian Inexactness in Second-Order Methods for Variational Inequalities: Lower Bounds, Optimal Algorithms and Quasi-Newton Approximations**, [2405.15990](#) (May 2024)<sup>1</sup>
53. [S. Choudhury](#), [N. Tupitsa](#), [N. Loizou](#), [S. Horváth](#), [M. Takác](#), [E. Gorbunov](#). **Remove that Square Root: A New Efficient Scale-Invariant Version of AdaGrad**, [2403.02648](#) (March 2024)
52. [N. Tupitsa](#), [S. Horváth](#), [M. Takác](#), [E. Gorbunov](#). **Federated Learning Can Find Friends That Are Beneficial**, [arXiv:2402.05050](#) (February 2024)
51. N. Kornilov, [Y. Dorn](#), [A. Lobanov](#), [N. Kutuzov](#), I. Shibaev, [E. Gorbunov](#), [A. Gasnikov](#), A. Nazin **Zeroth-order Median Clipping for Non-Smooth Convex Optimization Problems with Heavy-tailed Symmetric Noise**, [arXiv:2402.02461](#) (February 2024)
50. [G. Malinovsky](#), [P. Richtárik](#), [S. Horváth](#), [E. Gorbunov](#). **Byzantine Robustness and Partial Participation Can Be Achieved Simultaneously: Just Clip Gradient Differences**, [arXiv:2311.14127](#) (November 2023)
49. [N. Tupitsa](#), [A. J. Almansoori](#), Y. Wu, [M. Takác](#), [K. Nandakumar](#), [S. Horváth](#), [E. Gorbunov](#). **Byzantine-Tolerant Methods for Distributed Variational Inequalities**, [arXiv:2311.04611](#) (November 2023)  
[NeurIPS 2023](#)
48. [N. Puchkin\\*](#), [E. Gorbunov\\*](#), [N. Kutuzov](#), [A. Gasnikov](#) (\*equal contribution). **Breaking the Heavy-Tailed Noise Barrier in Stochastic Optimization Problems**, [Proceedings of The 27th International Conference on Artificial Intelligence and Statistics](#), PMLR 238:856-864, [arXiv:2311.04161](#) (November 2023)  
[AISTATS 2024](#)
47. N. Kornilov, [O. Shamir](#), [A. Lobanov](#), [D. Dvinskikh](#), [A. Gasnikov](#), I. Shibaev, [E. Gorbunov](#), [S. Horváth](#). **Accelerated Zeroth-order Method for Non-Smooth Stochastic Convex Optimization Problem with Infinite Variance**, [arXiv:2310.18763](#) (October 2023)  
[NeurIPS 2023](#)
46. [A. Rammal](#), K. Gruntkowska, N. Fedin, [E. Gorbunov](#), [P. Richtárik](#). **Communication Compression for Byzantine Robust Learning: New Efficient Algorithms and Improved Rates**, [Proceedings of The 27th International Conference on Artificial Intelligence and Statistics](#), PMLR 238:1207-1215 [arXiv:2310.09804](#) (October 2023)  
[AISTATS 2024](#)
45. [E. Gorbunov](#), [A. Sadiev](#), [M. Danilova](#), [S. Horváth](#), [G. Gidel](#), [P. Dvurechensky](#), [A. Gasnikov](#), [P. Richtárik](#). **High-Probability Convergence for Composite and Distributed Stochastic Minimization and Variational Inequalities with Heavy-Tailed Noise**, [arXiv:2310.01860](#) (October 2023)  
[ICML 2024 \(oral\)](#)
44. N. Kornilov, [E. Gorbunov](#), [M. Alkousa](#), F. Stonyakin, [P. Dvurechensky](#), [A. Gasnikov](#). **Intermediate Gradient Methods with Relative Inexactness**, [arXiv:2310.00506](#) (October 2023)

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<sup>1</sup>The date when it first appeared online.

43. S. Khirirat, E. Gorbunov, S. Horváth, R. Islamov, F. Karay, P. Richtárik. **Clip21: Error Feedback for Gradient Clipping**, [2305.18929](#) (May 2023)
42. K. Mishchenko, R. Islamov, E. Gorbunov, S. Horváth. **Partially Personalized Federated Learning: Breaking the Curse of Data Heterogeneity**, [2305.18285](#) (May 2023)
41. Y. Dorn, N. Kornilov, N. Kutuzov, A. Nazin, E. Gorbunov, A. Gasnikov. **Implicitly normalized forecaster with clipping for linear and non-linear heavy-tailed multi-armed bandits**, [2305.06743](#) (May 2023)
40. E. Gorbunov. **Unified analysis of SGD-type methods**, [2303.16502](#) (March 2023)
39. N. Fedin, E. Gorbunov. **Byzantine-Robust Loopless Stochastic Variance-Reduced Gradient**, *MOTOR 2023*, [2303.04560](#) (March 2023)  
*MOTOR 2023*
38. S. Choudhury, E. Gorbunov, N. Loizou. **Single-Call Stochastic Extragradient Methods for Structured Non-monotone Variational Inequalities: Improved Analysis under Weaker Conditions**, [arXiv:2302.14043](#) (February 2023)  
*NeurIPS 2023*
37. A. Sadiev, M. Danilova, E. Gorbunov, S. Horváth, G. Gidel, P. Dvurechensky, A. Gasnikov, P. Richtárik. **High-Probability Bounds for Stochastic Optimization and Variational Inequalities: the Case of Unbounded Variance**, [arXiv:2302.00999](#) (February 2023)  
*ICML 2023*
36. A. Gasnikov, D. Dvinskikh, P. Dvurechensky, E. Gorbunov, A. Beznosikov, A. Lobanov. **Randomized gradient-free methods in convex optimization**, [arXiv:2211.13566](#) (November 2022)
35. E. Gorbunov, A. Taylor, S. Horváth, G. Gidel. **Convergence of Proximal Point and Extragradient-Based Methods Beyond Monotonicity: the Case of Negative Comonotonicity**, [arXiv:2210.13831](#) (October 2022)  
*ICML 2023*
34. A. Beznosikov, B. Polyak, E. Gorbunov, D. Kovalev, A. Gasnikov. **Smooth Monotone Stochastic Variational Inequalities and Saddle Point Problems – Survey**, *European Mathematical Society Magazine*, (127), 15-28, [arXiv:2208.13592](#) (August 2022)  
*European Mathematical Society Magazine*
33. A. Sadiev, G. Malinovsky, E. Gorbunov, I. Sokolov, A. Khaled, K. Burlachenko, P. Richtárik. **Federated Optimization Algorithms with Random Reshuffling and Gradient Compression**, [arXiv:2206.07021](#) (June 2022)
32. E. Gorbunov\*, M. Danilova\*, D. Dobre\*, P. Dvurechensky, A. Gasnikov, G. Gidel (\*equal contribution). **Clipped Stochastic Methods for Variational Inequalities with Heavy-Tailed Noise**, [arXiv:2206.01095](#) (June 2022)  
*NeurIPS 2022*
31. E. Gorbunov, S. Horváth, P. Richtárik, G. Gidel. **Variance Reduction is an Antidote to Byzantines: Better Rates, Weaker Assumptions and Communication Compression as a Cherry on the Top**, [arXiv:2206.00529](#) (June 2022)  
*ICLR 2023*
30. E. Gorbunov, A. Taylor, G. Gidel. **Last-Iterate Convergence of Optimistic Gradient Method for Monotone Variational Inequalities**, [arXiv:2205.08446](#) (May 2022)  
*NeurIPS 2022*
29. M. Danilova, E. Gorbunov. **Distributed Methods with Absolute Compression and Error Compensation**, [arXiv:2203.02383](#) (March 2022)  
*MOTOR 2022*



28. A. Beznosikov\*, E. Gorbunov\*, H. Berard\*, N. Loizou (\*equal contribution). **Stochastic Gradient Descent-Ascent: Unified Theory and New Efficient Methods**, *Proceedings of The 26th International Conference on Artificial Intelligence and Statistics*, PMLR 206:172-235, arXiv:2202.07262 (February 2022)  
AISTATS 2023
27. P. Richtárik, I. Sokolov, I. Fatkhullin, E. Gasanov, Z. Li, E. Gorbunov. **3PC: Three Point Compressors for Communication-Efficient Distributed Training and a Better Theory for Lazy Aggregation**, *Proceedings of the 39th International Conference on Machine Learning*, PMLR 162:18596-18648, 2202.00998 (February 2022)  
ICML 2022
26. E. Gorbunov, H. Berard, G. Gidel, N. Loizou. **Stochastic Extragradient: General Analysis and Improved Rates**, *Proceedings of The 25th International Conference on Artificial Intelligence and Statistics*, PMLR 151:7865-7901, arXiv:2111.08611 (November 2021)  
AISTATS 2022
25. E. Gorbunov, N. Loizou, G. Gidel. **Extragradient Method:  $\mathcal{O}(1/K)$  Last-Iterate Convergence for Monotone Variational Inequalities and Connections With Cocoercivity**, *Proceedings of The 25th International Conference on Artificial Intelligence and Statistics*, PMLR 151:366-402, arXiv:2110.04261 (October 2021)  
AISTATS 2022
24. I. Fatkhullin, I. Sokolov, E. Gorbunov, Z. Li, P. Richtárik. **EF21 with Bells & Whistles: Practical Algorithmic Extensions of Modern Error Feedback**, arXiv preprint arXiv:2110.03294 (October 2021)
23. E. Gorbunov\*, A. Borzunov\*, M. Diskin, M. Ryabinin (\*equal contribution). **Secure Distributed Training at Scale**, *Proceedings of the 39th International Conference on Machine Learning*, PMLR 162:7679-7739, arXiv:2106.11257 (June 2021)  
ICML 2022
22. E. Gorbunov, M. Danilova, I. Shibaev, P. Dvurechensky, A. Gasnikov. **Near-Optimal High Probability Complexity Bounds for Non-Smooth Stochastic Optimization with Heavy-Tailed Noise**, arXiv preprint arXiv:2106.05958 (June 2021)
21. M. Ryabinin\*, E. Gorbunov\*, V. Plokhotnyuk, G. Pekhimenko (\*equal contribution). **Moshpit SGD: Communication-Efficient Decentralized Training on Heterogeneous Unreliable Devices**, *Advances in Neural Information Processing Systems*, 34, arXiv:2103.03239 (March 2021)  
NeurIPS 2021
20. E. Gorbunov, K. Burlachenko, Z. Li, P. Richtárik. **MARINA: Faster Non-Convex Distributed Learning with Compression**, *Proceedings of the 38th International Conference on Machine Learning*, PMLR 139:3788-3798, arXiv:2102.07845 (February 2021)  
ICML 2021
19. M. Danilova, P. Dvurechensky, A. Gasnikov, E. Gorbunov, S. Guminov, D. Kamzolov, I. Shibaev. **Recent Theoretical Advances in Non-Convex Optimization**, arXiv preprint arXiv:2012.06188 (December 2020)  
High-Dimensional Optimization and Probability 2022
18. E. Gorbunov, A. Rogozin, A. Beznosikov, D. Dvinskikh and A. Gasnikov. **Recent theoretical advances in decentralized distributed convex optimization**, arXiv preprint arXiv:2011.13259 (November 2020)  
High-Dimensional Optimization and Probability 2022
17. E. Gorbunov, F. Hanzely and P. Richtárik. **Local SGD: Unified Theory and New Efficient Methods**, *Proceedings of The 24th International Conference on Artificial Intelligence*

and Statistics, PMLR 130:3556-3564, arXiv:2011.02828 (November 2020)  
AISTATS 2021

16. E. Gorbunov, D. Kovalev, D. Makarenko and P. Richtárik. **Linearly Converging Error Compensated SGD**, *Advances in Neural Information Processing Systems* 33, arXiv:2010.12292 (October 2020)  
NeurIPS 2020 (spotlight)
15. E. Gorbunov, M. Danilova and A. Gasnikov. **Stochastic Optimization with Heavy-Tailed Noise via Accelerated Gradient Clipping**, *Advances in Neural Information Processing Systems* 33, arXiv preprint arXiv:2005.10785 (May 2020)  
NeurIPS 2020
14. A. Beznosikov, E. Gorbunov and A. Gasnikov. **Derivative-Free Method For Decentralized Distributed Non-Smooth Optimization**, *IFAC-PapersOnLine*, Volume 53, Issue 2, 2020, Pages 4038-4043, DOI: <https://doi.org/10.1016/j.ifacol.2020.12.2272>, arXiv preprint arXiv:1911.10645 (November 2019)  
IFAC 2020
13. E. Gorbunov, D. Dvinskikh, A. Gasnikov. **Optimal Decentralized Distributed Algorithms for Stochastic Convex Optimization**, arXiv preprint arXiv:1911.07363 (November 2019)
12. E. Vorontsova, A. Gasnikov, E. Gorbunov and P. Dvurechensky. **Accelerated Gradient-Free Optimization Methods with a Non-Euclidean Proximal Operator**, *Automation and Remote Control*, August 2019, Volume 80, Issue 8, pp 1487-1501, <https://doi.org/10.1134/S0005117919080095> (August 2019)  
Automation and Remote Control 2019
11. E. Gorbunov, A. Bibi, O. Sener, E. Bergou and P. Richtárik. **A Stochastic Derivative Free Optimization Method with Momentum**, *ICLR 2020*, arXiv:1905.13278 (May 2019)  
ICLR 2020
10. E. Gorbunov, F. Hanzely and P. Richtárik. **A unified theory of SGD: variance reduction, sampling, quantization and coordinate descent**, *Proceedings of the Twenty Third International Conference on Artificial Intelligence and Statistics*, PMLR 108:680-690, 2020, arXiv:1905.11261 (May 2019)  
AISTATS 2020
9. D. Dvinskikh, E. Gorbunov, A. Gasnikov, P. Dvurechensky and César A. Uribe. **On Dual Approach for Distributed Stochastic Convex Optimization over Networks**, *58th Conference on Decision and Control*, arXiv preprint arXiv:1903.09844 (March 2019)  
CDC 2019
8. E. Bergou, E. Gorbunov and P. Richtárik. **Stochastic Three Points Method for Unconstrained Smooth Minimization**, *SIAM Journal on Optimization* 30, no. 4 (2020): 2726-2749, arXiv:1902.03591 (February 2019)  
SIAM Journal on Optimization 2020
7. K. Mishchenko, E. Gorbunov, M. Takác and P. Richtárik. **Distributed Learning with Compressed Gradient Differences**, arXiv preprint arXiv:1901.09269 (January 2019)
6. A. Gasnikov, E. Gorbunov, D. Kovalev, A. Mohammed, E. Chernousova. **The global rate of convergence for optimal tensor methods in smooth convex optimization**, *Computer Research and Modeling*, 2018, Vol. 10:6, <https://doi.org/10.20537/2076-7633-2018-10-6-737-753>, arXiv:1809.00382 (September 2018)  
Computer Research and Modeling 2018
5. E. Gorbunov, E. Vorontsova and A. Gasnikov. **On the upper bound for the mathematical expectation of the norm of a vector uniformly distributed on the sphere and the phenomenon of concentration of uniform measure on the sphere**, *Mathematical Notes*, 2019, Volume 106, Issue 1, Pages 13-23, <https://doi.org/10.4213/mzm12041>,



[arXiv:1804.03722](#) (April 2018)

[Mathematical Notes](#) 2019

4. [P. Dvurechensky](#), [E. Gorbunov](#) and [A. Gasnikov](#). **An Accelerated Directional Derivative Method for Smooth Stochastic Convex Optimization**, *European Journal of Operational Research*, <https://doi.org/10.1016/j.ejor.2020.08.027>, [arXiv:1804.02394](#) (April 2018)  
[European Journal of Operational Research](#) 2020
3. [E. Gorbunov](#), [P. Dvurechensky](#) and [A. Gasnikov](#). **An Accelerated Method for Derivative-Free Smooth Stochastic Convex Optimization**, *SIAM Journal on Optimization*, 32(2), 1210-1238, [arXiv:1802.09022](#) (February 2018)  
[SIAM Journal on Optimization](#) 2022
2. [D. Kovalev](#), [E. Gorbunov](#), [E. Gasanov](#) and [P. Richtárik](#) **Stochastic Spectral and Conjugate Descent Methods**, *Advances in Neural Information Processing Systems* 31, [arXiv:1802.03703](#) (February 2018)  
[NeurIPS](#) 2019
1. [E. Vorontsova](#), [A. Gasnikov](#) and [E. Gorbunov](#). **Accelerated Directional Search with non-Euclidean prox-structure**, *Automation and Remote Control*, April 2019, Volume 80, Issue 4, pp 693-707, <https://doi.org/10.1134/S0005117919040076>, [arXiv:1710.00162](#) (September 2017)  
[Automation and Remote Control](#) 2019

## TALKS AND POSTERS

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51. 29 May, 2024. [NETYS 2024](#), online. **Keynote talk** “Byzantine Robustness and Partial Participation Can Be Achieved Simultaneously: Just Clip Gradient Differences”. Links: [slides](#)
50. 3 May, 2024. [AISTATS 2024](#), Valencia, Spain. Poster: “Communication Compression for Byzantine Robust Learning: New Efficient Algorithms and Improved Rates”. Links: [poster](#)
49. 3 May, 2024. [AISTATS 2024](#), Valencia, Spain. Poster: “Breaking the Heavy-Tailed Noise Barrier in Stochastic Optimization Problems”. Links: [poster](#)
48. 7 February, 2024. [Federated Learning One-World Seminar](#), online. Talk “Variance Reduction is an Antidote to Byzantines: Better Rates, Weaker Assumptions and Communication Compression as a Cherry on the Top”. Links: [slides](#), [video](#)
47. 10 December - 16 December, 2023. [NeurIPS 2023](#), New Orleans, USA. Poster: “Single-Call Stochastic Extragradient Methods for Structured Non-monotone Variational Inequalities: Improved Analysis under Weaker Conditions”. Links: [poster](#)
46. 10 December - 16 December, 2023. [NeurIPS 2023](#), New Orleans, USA. Poster: “Accelerated Zeroth-order Method for Non-Smooth Stochastic Convex Optimization Problem with Infinite Variance”. Links: [poster](#)
45. 10 December - 16 December, 2023. [NeurIPS 2023](#), New Orleans, USA. Poster: “Byzantine-Tolerant Methods for Distributed Variational Inequalities”. Links: [poster](#)
44. 15 September, 2023. TES Conference on Mathematical Optimization for Machine Learning, Berlin, Germany. Talk: “Clipped Methods for Stochastic Optimization with Heavy-Tailed Noise”. Links: [slides](#)
43. 27 July, 2023. [ICML 2023](#), Honolulu, USA. Poster: “High-Probability Bounds for Stochastic Optimization and Variational Inequalities: the Case of Unbounded Variance”. Links: [poster](#)

42. 25 July, 2023. [ICML 2023](#), Honolulu, USA. Poster: “Convergence of Proximal Point and Extragradient-Based Methods Beyond Monotonicity: the Case of Negative Comonotonicity”. Links: [poster](#)
41. 6 June, 2023. [Oberseminar at LT Group, University of Hamburg](#), Hamburg, Germany. Talk: “Algorithms for Stochastic Optimization with Heavy-Tailed Noise and Connections with the Training of Large Language Models”. Links: [slides](#)
40. 2 May, 2023. [ICLR 2023](#), Kigali, Rwanda. Poster: “Variance Reduction is an Antidote to Byzantines: Better Rates, Weaker Assumptions and Communication Compression as a Cherry on the Top”. Links: [poster](#)
39. 27 April, 2023. [AISTATS 2023](#), Valencia, Spain. Poster: “Stochastic Gradient Descent-Ascent: Unified Theory and New Efficient Methods”. Links: [poster](#)
38. 13 February, 2023. [PEP talks](#), UCLouvain, Belgium. Talk “Convergence of Proximal Point and Extragradient-Based Methods Beyond Monotonicity: the Case of Negative Comonotonicity”. Links: [video](#), [slides](#)
37. 28 November - 9 December, 2022. [NeurIPS 2022](#), New Orleans, USA. Poster: “Clipped Stochastic Methods for Variational Inequalities with Heavy-Tailed Noise”. Links: [poster](#)
36. 28 November - 9 December, 2022. [NeurIPS 2022](#), New Orleans, USA. Poster: “Last-Iterate Convergence of Optimistic Gradient Method for Monotone Variational Inequalities”. Links: [poster](#)
35. 8 October, 2022. [MBZUAI Workshop on Collaborative Learning: From Theory to Practice](#), Abu Dhabi, UAE. Talk “Variance Reduction is an Antidote to Byzantines: Better Rates, Weaker Assumptions and Communication Compression as a Cherry on the Top”. Links: [slides](#)
34. 9 September, 2022. [All-Russian Optimization Seminar](#), online. Talk “Methods with Clipping for Stochastic Optimization and Variational Inequalities with Heavy-Tailed Noise” (in Russian). Links: [video](#), [slides](#)
33. 21 July, 2022. [ICML 2022](#), Baltimore, USA. Poster: “Secure Distributed Training at Scale”. Links: [poster](#)
32. 21 July, 2022. [ICML 2022](#), Baltimore, USA. Poster: “3PC: Three Point Compressors for Communication-Efficient Distributed Training and a Better Theory for Lazy Aggregation”. Links: [poster](#)
31. 3 July, 2022. [MOTOR 2022](#), Petrozavodsk, Russia. Talk: “Distributed Methods with Absolute Compression and Error Compensation”. Links: [slides](#)
30. 25 April, 2022. [Lagrange Workshop on Federated Learning](#), online. Talk: “Secure Distributed Training at Scale”. Links: [slides](#)
29. 29 March, 2022. [AISTATS 2022](#), online. Poster “Extragradient Method:  $\mathcal{O}(1/K)$  Last-Iterate Convergence for Monotone Variational Inequalities and Connections With Co-coercivity”. Links: [poster](#)
28. 28 March, 2022. [AISTATS 2022](#), online. Poster “Stochastic Extragradient: General Analysis and Improved Rates”. Links: [poster](#)
27. 13 March, 2022. [Rising Stars in AI Symposium 2022](#), KAUST, Saudi Arabia. Talk “Extragradient Method:  $\mathcal{O}(1/K)$  Last-Iterate Convergence for Monotone Variational Inequalities and Connections With Co-coercivity”. Links: [slides](#), [video](#)
26. 16 February, 2022. [Vector Institute Endless Summer School session “NeurIPS 2021 Highlights”](#), online. Talk “Moshpit SGD: Communication-Efficient Decentralized Training on Heterogeneous Unreliable Devices” (jointly with [Max Ryabinin](#)). Links: [slides](#)

25. 20 December, 2021. [MLO EPFL](#) internal seminar, online. Talk “Moshpit SGD: Communication-Efficient Decentralized Training on Heterogeneous Unreliable Devices”. Links: [slides](#)
24. 10 December, 2021. [NeurIPS 2021](#), online. Poster “Moshpit SGD: Communication-Efficient Decentralized Training on Heterogeneous Unreliable Devices”. Links: [poster](#)
23. 1 December, 2021. [MTL MLOpt](#) (internal seminar), online. Talk “Extragradient Method:  $\mathcal{O}(1/K)$  Last-Iterate Convergence for Monotone Variational Inequalities and Connections With Cocoercivity”. Links: [slides](#)
22. 17 November, 2021. [All-Russian Optimization Seminar](#), online. Talk “Extragradient Method:  $\mathcal{O}(1/K)$  Last-Iterate Convergence for Monotone Variational Inequalities and Connections With Cocoercivity” (in Russian). Links: [video](#), [slides](#)
21. 3 November, 2021. [Federated Learning One-World Seminar](#), online. Talk “Secure Distributed Training at Scale”. Links: [video](#), [slides](#)
20. 21 July, 2021. [ICML 2021](#), online. Poster “MARINA: Faster Non-Convex Distributed Learning with Compression”. Links: [poster](#)
19. 14 April, 2021. [AISTATS 2021](#), online. Poster “Local SGD: Unified Theory and New Efficient Methods”. Links: [poster](#)
18. 10 March, 2021, [Federated Learning One-World Seminar](#), online. Talk “MARINA: Faster Non-Convex Distributed Learning with Compression”. Links: [video](#), [slides](#)
17. 19 January, 2021. [NeurIPS New Year AfterParty at Yandex](#). Talk “Linearly Converging Error Compensated SGD”. Links: [video](#)
16. 9 December, 2020. [NeurIPS 2020](#), online. Poster “Stochastic Optimization with Heavy-Tailed Noise via Accelerated Gradient Clipping” (presented by [M. Danilova](#)). Links: [video](#), [poster](#)
15. 9 December, 2020. [NeurIPS 2020](#), online. Poster “Linearly Converging Error Compensated SGD”. Links: [video](#), [poster](#)
14. 7 October, 2020, [Federated Learning One-World Seminar](#) and [Russian Optimization Seminar](#), online. Talk “Linearly Converging Error Compensated SGD”. Links: [video](#), [slides](#)
13. 26 – 28 August, 2020, 23rd International Conference on Artificial Intelligence and Statistics ([AISTATS 2020](#)), online. I have presented our joint work with [Filip Hanzely](#) and [Peter Richtárik](#) called “A Unified Theory of SGD: Variance Reduction, Sampling, Quantization and Coordinate Descent”. Links: [video](#)
12. 8 July, 2020, [Russian Optimization Seminar](#), online. Talk “On the convergence of SGD-like methods for convex and non-convex optimization problems” (in Russian). Links: [video](#), [slides](#)
11. 28 June – 10 July, 2020, Machine Learning Summer School, online. I have presented our joint work with [Dmitry Kovalev](#), Dmitry Makarenko and [Peter Richtárik](#) called “Linearly Converging Error Compensated SGD”. Links: [video](#), [slides](#)
10. 27 – 30 April, 2020, 8-th International Conference on Learning Representations ([ICLR 2020](#)), online. I have presented our joint work with [Adel Bibi](#), [Ozan Sener](#), [El Houcine Bergou](#) and [Peter Richtárik](#) called “A Stochastic Derivative Free Optimization Method with Momentum”. Links: [video](#)
9. 14 December, 2019, [NeurIPS 2019 workshop “Optimization Foundations for Reinforcement Learning”](#), Vancouver, Canada. [Poster](#) “A Stochastic Derivative Free Optimization Method with Momentum”

8. 13 December, 2019, NeurIPS 2019 workshop “[Beyond First Order Methods in ML](#)”, Vancouver, Canada. [Poster](#) “An Accelerated Method for Derivative-Free Smooth Stochastic Convex Optimization”
7. 18 October, 2019, [SIERRA](#) research seminar, INRIA. Talk “A Unified Theory of SGD: Variance Reduction, Sampling, Quantization and Coordinate Descent”. Links: [slides](#)
6. 1-6 July 2018, [23rd International Symposium on Mathematical Programming](#), Bordeaux, France. [Talk](#) “An Accelerated Directional Derivative Method for Smooth Stochastic Convex Optimization”
5. 10-15 June 2018, Traditional Youth School “Control, Information and Optimization” organized by [Boris Polyak](#) and [Elena Gryazina](#), Voronovo, Russia. [Poster](#) and [Talk](#) “An Accelerated Directional Derivative Method for Smooth Stochastic Convex Optimization”
4. 14 April 2018, Workshop “Optimization at Work”, MIPT, Dolgoprudny, Russia. [Talk](#) “An Accelerated Method for Derivative-Free Smooth Stochastic Convex Optimization”
3. 5-7 February 2018, [KAUST Research Workshop on Optimization and Big Data](#), KAUST, Thuwal, Saudi Arabia. Joint [Poster](#) “Stochastic Spectral Descent Methods” with D. Kovalev and E. Gasanov
2. 25 November 2017, 60th Scientific Conference of MIPT, Section of Information Transmission Problems, Data Analysis and Optimization, IITP, Moscow, Russia. [Talk](#) “About accelerated Directional Search with non-Euclidean prox-structure”
1. 27 October 2017, Workshop “Optimization at Work”, MIPT, Dolgoprudny, Russia. [Talk](#) “Accelerated Directional Search with non-Euclidean prox-structure”

## REVIEWING

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- [ICML 2024](#): 6 papers.
- [Mathematical Programming](#): 1 paper (in 2024)
- [Transactions on Machine Learning Research](#): 1 paper (in 2024)
- [Journal Numerische Mathematik](#): 1 paper (in 2023)
- [ICLR 2024](#): 2 papers
- [Journal of Machine Learning Research \(JMLR\)](#): 1 paper (in 2023)
- [SIAM Journal on Mathematics of Data Science \(SIMODS\)](#): 1 paper (in 2023)
- [NeurIPS 2023](#): 6 papers
- [AISTATS 2023](#): 4 papers
- [ICLR 2023](#): 5 papers
- [NeurIPS 2022](#): 4 papers. I got “[outstanding reviewer award](#)” and a free registration to the conference
- [Transactions on Machine Learning Research](#): 1 paper (in 2022)
- [Science China Mathematics](#): 1 paper (in 2021-2022).
- [ICML 2022](#): 4 papers. I got “[outstanding reviewer award](#)” and a free registration to the conference
- [SIAM Journal on Optimization \(SIOPT\)](#): 1 paper (in 2021-2022)
- [AISTATS 2022](#): 2 papers

- [ICLR 2022](#): 2 papers
- [NeurIPS 2021](#): 7 papers. I got “[outstanding reviewer award](#)” (top 8% of reviewers) and a free registration to the conference
- [ICML 2021](#): 4 papers (**expert reviewer**). I was among [the top 10% of reviewers](#) and got a free registration to the conference
- [ICLR 2021](#): 2 papers. I was recognized as an “[outstanding reviewer](#)” and got a free registration to the conference
- [SIAM Journal on Optimization \(SIOPT\)](#): 1 paper (in 2020)
- [NeurIPS 2020](#): 6 papers. I was among [the top 10% of reviewers](#) and got a free registration to the conference
- [Journal of Machine Learning Research \(JMLR\)](#): 1 paper (in 2020)
- [Optimization Methods and Software](#): 1 paper (in 2019)
- [ICML 2019](#): 4 papers

## TEACHING

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- **Mentor for 2 students’ research projects** at the summer school “Modern Methods of Information Theory, Optimization and Control Theory” ([Sirius university](#), Sochi)
- **Co-creator and lecturer of the course** “Optimization Methods for Machine Learning” in [MADE](#), Mail.ru Group (Spring 2020, Spring 2021, Spring 2022) and [MIPT](#) (Fall 2020)
- **Organizer of [Russian Optimization Seminar](#)**: May 2020 – August 2022
- **Organizer of [research seminar on Optimization at MIPT](#)**: March 2020 – June 2020
- **Teaching assistant for the courses**
  - Fall 2022, Spring 2023: ML712: Distributed and Federated Learning ([MBZUAI](#)): created and presented lectures on 2 topics (out of 8 topics), replied to the students questions, mentored the projects, checked and created quizzes
  - Spring 2019: [Algorithms and Models of Computation](#)
  - Fall 2018: [Probability Theory](#)
  - Spring 2018: [Algorithms and Models of Computation](#)

## SUMMER SCHOOLS

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- **28 June - 10 July 2020**. Participant of [Machine Learning Summer School](#). I have presented our joint work with [Dmitry Kovalev](#), Dmitry Makarenko and [Peter Richtárik](#) called “Linearly Converging Error Compensated SGD”. Links: [video](#), [slides](#)
- **June 2018**. Participant of Traditional Youth School “Control, Information and Optimization”
- **June 2017**. Participant of Traditional Youth School “Control, Information and Optimization”
- **July 2015**. [Participant](#) of Summer School “Contemporary Mathematics” in Dubna
- **July 2014**. [Participant](#) of Summer School “Contemporary Mathematics” in Dubna



## INTERESTS

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- Wakesurfing, Fitness, Hiking
- Football: 9 years in football school in Rybinsk, Russia. I was also playing for an [amateur team](#)

Last Updated on June 4, 2024