

Rustem Islamov

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EDUCATION

PhD in Computer Science

[University of Basel](#)

Oct. 2023 – Pres.

Basel, Switzerland

Master of Science in Applied Mathematics

[Institut Polytechnique de Paris](#)

Sept. 2021 – Aug. 2023

Palaiseau, France

GPA: 17.65/20, [transcript of records](#)

Bachelor of Science in Applied Mathematics and Physics

[Moscow Institute of Physics and Technology](#)

Sept. 2017 – July 2021

Dolgoprudny, Russia

GPA: 4.95/5 (9.27/10), Top 3 at the department, [transcript of records](#)

RESEARCH INTERESTS

Machine Learning, Optimization, Distributed Optimization

RECENT RESEARCH PROJECTS

Error-Feedback for SGD

[CISPA](#), Supervisor: [Sebastian Stich](#)

Oct. 2022 – Oct. 2023

Saarbrücken, Germany

Brief description: develop a theory for SGD with biased compression which recovers optimal rates in all possible scenarios.

Analysis of Gradient-type methods over directed graphs

[EPFL](#), Supervisor: [Hadrien Hendrikx](#), Links: [technical report](#)

Apr. 2022 – Aug. 2022

Lausanne, Switzerland

Brief description: development of a theory for gradient-type methods over directed graphs. The goal is to create a method which supports stochastic updates, variance reduction and acceleration and whose convergence rates match optimal rates in undirected case.

Adaptive stepsize selection for PDHG algorithm

[IP Paris](#), Supervisor: [Olivier Fercoq](#), Links: [technical report](#)

Sept. 2021 – Mar. 2021

Palaiseau, France

Brief description: the goal is to develop a mechanism for adaptive stepsize selection for PDHG. The idea is based on checking in each iteration the Quadratic Error Bound inequality introduced in [\[Fercoq, 2021\]](#).

Second Order Methods for Distributed Optimization

[KAUST](#), Supervisor: [Peter Richtárik](#)

Jul. 2020 – Dec. 2020

Thuwal, Saudi Arabia

Brief description: development of a theory for Newton-type methods for distributed optimization. The goal is to create the first communication-efficient Newton-type method that inherits its local superlinear convergence. As a part of internship, I attended the course on modern analysis of a family SGD algorithms by Prof. Richtárik.

PUBLICATIONS

9. [Y. Gao*](#), [R. Islamov*](#), [S. Stich](#) (*equal contribution). **EControl: Fast Distributed Optimization with Compression and Error Control**, in [Proc. of the 12th International Conference on Learning Representations](#), 2023.
8. [R. Islamov](#), [M. Safaryan](#), [D. Alistarh](#). **AsGrad: A Sharp Unified Analysis of Asynchronous-SGD Algorithms**, [arXiv preprint arXiv: 2310.20452](#), accepted to AISTATS 2024, 2023.
7. [K. Mishchenko](#), [R. Islamov](#), [E. Gorbunov](#), [S. Horváth](#). **Partially Personalized Federated Learning: Breaking the Curse of Data Heterogeneity**, [arXiv preprint arXiv: 2305.18285](#), 2023.
6. [S. Khirirat](#), [E. Gorbunov](#), [S. Horváth](#), [R. Islamov](#), [F. Karray](#), [P. Richtárik](#). **Clip21: Error Feedback for Gradient Clipping**, [arXiv preprint arXiv: 2305.18929](#), 2023.
5. [M. Makarenko](#), [E. Gasanov](#), [R. Islamov](#), [A. Sadiev](#), [P. Richtárik](#). **Adaptive Compression for Communication-Efficient Distributed Training**, [Transactions on Machine Learning Research](#), 2022.
4. [R. Islamov](#), [X. Qian](#), [S. Hanzely](#), [M. Safaryan](#), [P. Richtárik](#). **Distributed Newton-Type Methods with Communication Compression and Bernoulli Aggregation**, [Transactions on Machine Learning Research](#), 2022.

3. X. Qian, R. Islamov, M. Safaryan, P. Richtárik. **Basis Matters: Better Communication-Efficient Second Order Methods for Federated Learning**, in [Proc. of the 25th International Conference on Artificial Intelligence and Statistics](#), 2022.
2. M. Safaryan, R. Islamov, X. Qian, P. Richtárik. **FedNL: Making Newton-Type Methods Applicable to Federated Learning**, In [Proc. of 39th International Conference on Machine Learning](#), 2022.
1. R. Islamov, X. Qian, P. Richtárik. **Distributed Second Order Methods with Fast Rates and Compressed Communication**, In [Proc. of 38th International Conference on Machine Learning](#), 2021.

RESEARCH VISITS AND INTERNSHIPS

Internship at Distributed Algorithms and Systems Lab IST Austria, Supervisors: Mher Safaryan , Dan Alistarh	Apr. 2023 – Oct. 2023 Klosterneuburg, Austria
Internship at Machine Learning and Optimization Lab EPFL, Supervisors: Hadrien Hendrikx , Martin Jaggi	Apr. 2022 – Aug. 2022 Lausanne, Switzerland
Internship at Optimization and Machine Learning Lab KAUST, Supervisor: Peter Richtárik	Mar. 2021 – Aug. 2021 Jul. 2020 – Dec. 2020 Thuwal, Saudi Arabia

SCHOLARSHIPS, HONORS AND AWARDS

French Embassy Scholarship Given to students enrolled to French universities with high academic achievements; 700 Euro per month	Sept. 2022 – May. 2023
PhD Track Excellence Scholarship IP Paris awards merit-based excellence scholarships for students enrolled in PhD tracks; 1000 Euro per month	Sept. 2021 – Mar. 2022 Sept. 2022 – Mar. 2023
Increased State Academic Scholarship Given to 4 year Bachelor and Master students at MIPT with scientific achievements; 16,000 Russian roubles per month	Feb. 2021 – June 2021 Sept. 2020 – Jan. 2021
Prizewinner of Student Olympiad in Maths “I am professional” Student Olympiad organized by Yandex and MIPT	Apr. 2020
Abramov scholarship Given to 1-3 year Bachelor students with the best grades at MIPT; 12,000 Russian rubles per month	Sept. 2017 – June 2020
Prizewinner of Final Round of All-Russian Physics Olympiad	Apr. 2016
Participant of Final Round of All-Russian Physics Olympiad	2015, 2017

TALKS AND POSTERS

Invited Talk at Rising Stars in AI Symposium at KAUST workshop, Links: paper , slides	21 February, 2024
Talk at NTDS workshop, Links: paper	24 October, 2023
Talk at CISPA for the group of Prof. Sebastian Stich , Links: paper	16 March, 2023
Talk at ETH AI Center Symposium for PhD fellows, Links: paper	9-10 February, 2023
Poster at NeurIPS workshop: Order up! The Benefits of Higher-Order Optimization in Machine Learning , Links: poster , paper	2 December, 2022
Poster at International Conference on Artificial Intelligence and Statistics , Links: poster , paper	29 March, 2022
Prerecorded Talk at Beyond first-order methods in ML systems workshop, Links: video , paper	24 July, 2021
Poster at International Workshop on Federated Learning for User Privacy and Data Confidentiality , Links: poster , paper	24 July, 2021
Poster and Prerecorded Talk at International Conference on Machine Learning , Links: video , poster , paper	22 July, 2021
Poster at PRAIRIE/MAI AI Summer School , Links: poster , paper	6 July, 2021
Talk at Maths & AI: MIPT-UGA young researchers workshop, Links: video , slides , paper	1 July, 2021
Prerecorded Talk at KAUST Conference on Artificial Intelligence , Links: video , paper	28 April, 2021
Poster at NSF-TRIPODS Workshop on Communication Efficient Distributed Optimization , Links: poster , paper	9 April, 2021

REVIEWING AND TEACHING

Teaching Assistant for Continuous Optimization course	Spring Semester 2024
Reviewer for International Conference on Machine Learning (ICML 2024)	2024
Reviewer for Journal on Machine Learning Research (JMLR)	2024
Reviewer for Journal of Parallel and Distributed Computing (JPDC)	2024
Reviewer for Journal of Optimization Theory and Applications (JOTA)	2023
Reviewer for Artificial Intelligence and Statistics Conference (AISTATS 2024)	2023

SUMMER SCHOOLS

PRAIRIE/MIAI AI Summer School , Links: certificate	5-9 July, 2021
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TECHNICAL SKILLS

Programming Languages: Python (NumPy, Matplotlib, PyTorch, Pandas), C++, LaTeX
Mathematics: Calculus, Linear Algebra, Probability Theory, Convex Analysis

LANGUAGES	HOBBIES AND INTERESTS
Russian: Native	Football, former member of student football team
English: Advanced (C1)	Travelling, hiking, photo shooting
French: Elementary (A1)	