

# Rustem Islamov

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## EDUCATION

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### PhD in Computer Science

[University of Basel](#)

Oct. 2023 – Pres.

Basel, Switzerland

### Master of Science in Applied Mathematics

[Institut Polytechnique de Paris](#)

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

Sept. 2021 – Aug. 2023

Palaiseau, France

### Bachelor of Science in Applied Mathematics and Physics

[Moscow Institute of Physics and Technology](#)

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

Sept. 2017 – July 2021

Dolgoprudny, Russia

## RESEARCH INTERESTS

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Machine Learning, Optimization, Distributed Optimization

## RECENT RESEARCH PROJECTS

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### Error-Feedback for SGD

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

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

Oct. 2022 – Oct. 2023

Saarbrücken, Germany

### Analysis of Gradient-type methods over directed graphs

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

*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.

Apr. 2022 – Aug. 2022

Lausanne, Switzerland

### Adaptive stepsize selection for PDHG algorithm

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

*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 [\[Fercoq, 2021\]](#).

Sept. 2021 – Mar. 2021

Palaiseau, France

### Second Order Methods for Distributed Optimization

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

*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.

Jul. 2020 – Dec. 2020

Thuwal, Saudi Arabia

## PUBLICATIONS

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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.

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## RESEARCH VISITS AND INTERNSHIPS

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

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## SCHOLARSHIPS, HONORS AND AWARDS

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

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## TALKS AND POSTERS

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

## SUMMER SCHOOLS

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[PRAIRIE/MIAI AI Summer School](#), Links: [certificate](#)

5-9 July, 2021

## TECHNICAL SKILLS

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**Programming Languages:** Python (NumPy, Matplotlib, PyTorch, Pandas), C++, LaTeX

**Mathematics:** Calculus, Linear Algebra, Probability Theory, Convex Analysis

## LANGUAGES

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**Russian:** Native

**English:** [Advanced \(C1\)](#)

**French:** Elementary (A1)

## HOBBIES AND INTERESTS

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Football, former member of student football team

Travelling, hiking, photo shooting

Last updated on February 7<sup>th</sup> 2024