GRIGORY MALINOVSKY

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grigory-malinovsky.github.io
Thuwal, Saudi Arabia

EDUCATION

King Abdullah University of Science and Technology (KAUST) *January 2022 – Present*
PhD in Applied Mathematics and Computational Sciences Thuwal, Saudi Arabia
Advisor: Peter Richtárik

King Abdullah University of Science and Technology (KAUST) *August 2020 – December 2021*
MS in Applied Mathematics and Computational Sciences Thuwal, Saudi Arabia
Advisor: Peter Richtárik **GPA:** 3.83/4.0

Moscow Institute of Physics and Technology (MIPT) *September 2014 – July 2019*
BS in Applied Mathematics and Physics Dolgoprudny, Russia
Advisor: Boris Polyak **GPA:** 4.73/5.0
Thesis: Averaged Heavy Ball Method

RESEARCH INTERESTS

Federated Learning, Distributed Optimization, Stochastic Optimization, Machine Learning

WORK EXPERIENCE

Samsung R&D Institute UK *April 2024 – October 2024*
Research Intern Engineer Staines, United Kingdom
Optimization Theory for LLMs

MIPT Research Group *January 2020 – July 2020*
Junior Researcher Moscow, Russia
Non-Convex Optimization

Tinkoff Summer Internship *July 2017*
Data Analyst Moscow, Russia
Customer Classification

RESEARCH VISITS

Mohamed bin Zayed University of Artificial Intelligence *October 2023*
Department of Machine Learning Abu Dhabi, UAE
I worked with Samuel Horvath and Eduard Gorbunov

CISPA Helmholtz Center for Information Security *June 2022*
Saarland University Saarbrücken, Germany
Internship in the group of Sebastian Stich

Moscow Institute of Physics and Technology *June 2021 – August 2021*
Machine Intelligence Laboratory Dolgoprugny, Russia
I worked with Ilia Zharikov

King Abdullah University of Science and Technology *January 2020 – February 2020*
Visual Computing Center Thuwal, Saudi Arabia
Internship in the group of Peter Richtárik

SCHOLARSHIPS, HONORS AND AWARDS

- **Membership** in the American Mathematical Society (AMS) (one of four KAUST recipients)
- **Progress Towards PhD** Rated as **"Outstanding"** for the 2023–2024 academic year at KAUST
- **Best Reviewer Award** at ICML 2024
- **2024 CEMSE Dean's List Award** for excellent results at KAUST ($2,500 cash prize)
  Thuwal, Saudi Arabia, 2024
- One of three KAUST nominees for the **Apple Scholars** in AI/ML PhD fellowship
  Thuwal, Saudi Arabia, 2023
- **Progress Towards PhD** Rated as **"Outstanding"** for the 2022–2023 academic year at KAUST
- **Summer of Reproducibility 2023 Flower AI Award** for completing the following baseline:
  TAMUNA: Doubly Accelerated Federated Learning with Local Training, Compression, and Partial Participation
  (jointly with Ivan Agarsky, $ 2000 cash prize)
- **2023 CEMSE Dean's List Award** for excellent results at KAUST ($2,500 cash prize)
  Thuwal, Saudi Arabia, 2023
- **Outstanding Reviewer Award** at NeurIPS 2022 (free registration)
- **Progress Towards PhD** Rated as **"Outstanding"** for the 2021–2022 academic year at KAUST
- **CEMSE Academic Excellence Award** for excellent academic results at KAUST ($2,500 cash prize)
  Thuwal, Saudi Arabia, 2022
- **Progress Towards PhD** Rated as **"Outstanding"** for the 2020–2021 academic year at KAUST
- **CEMSE Research Excellence Award** for excellent research results at KAUST ($1,000 cash prize)
  Thuwal, Saudi Arabia, 2021
- **Dean's Award** for a few top students accepted to KAUST ($6,000 annually during 3 years)
  Thuwal, Saudi Arabia, 2021
- **Best Talk Award** at 62th Scientific Conference at MIPT, Section "Data Analysis, Recognition and Prediction"
  Dolgoprudny, Russia, November 18–23, 2019
- **Best Poster Award** at Traditional Youth School "Control, Information and Optimization"
  Voronovo, Russia, June 17–22, 2019
- **Abramov's Fund Scholarship** for top students at MIPT
  Moscow, Russia, September 2016 – January 2017
- **Bronze Medal** at International Zhautykov Physics Olympiad
  Almaty, Kazakhstan, 2014
- **Prizewinner** at All-Russian School Physics Olympiad, Region Round
  Kazan, Russia, 2014
- **Prizewinner** at All-Russian Physics Olympiad, Final Round
  Vladivostok, Russia, 2013
- **Winner** at All-Russian Astronomy Olympiad, Region Round
  Kazan, Russia, 2013
- **Prizewinner** at All-Russian School Physics Olympiad, Region Round
  Kazan, Russia, 2012

SUPERVISION & MENTORING

I was supervising/mentoring the work of the following students/interns in the listed projects:

4. **Zhirayr Tovmasyan**. Project on the analysis of the Stochastic Proximal Point method under generalized smoothness and similarity assumptions.
   Led to a paper: Revisiting Stochastic Proximal Point Methods: Generalized Smoothness and Similarity *arXiv:2502.03401, 2025*

3. **Michał Grudzień**. Project on compression and importance sampling in accelerated Federated Learning.
   Led to a paper accepted to FL-ICML 2023 Workshop: **Improving Accelerated Federated Learning with Compression and Importance Sampling**, *arXiv:2306.03240, 2023*

2. **Michał Grudzień**. Project on partial participation in accelerated Federated Learning.
   Led to the paper accepted to AISTATS 2023: **Can 5th Generation Local Training Methods Support Client Sampling? Yes!** PMLR 1055-1092, 2023

1. **Abdurakhmon Sadiev**. Project on compression and Random Reshuffling in Federated Learning.
   Led to a paper accepted to FL-ICML 2023 Workshop and *38th Conference on Neural Information Processing Systems, NeurIPS 2024*: **Don't Compress Gradients in Random Reshuffling: Compress Gradient Differences**, *arXiv:2202.09357, 2022*

TEACHING

Teaching Assistant

- Stochastic Gradient Descent Methods (CS 331) — *KAUST Spring 2024*
- TAHAKOM Federated Learning course — *KAUST Fall 2023*
- Graduate Seminar (CS 398) — *KAUST Spring 2023*
- Introduction to Optimization Aramco Master course — *Saudi Aramco Fall 2022*
- Stochastic Gradient Descent Methods (CS 331) — *KAUST Fall 2022*
- Graduate Seminar (CS 398) — *KAUST Fall 2022*
- Stochastic Gradient Descent Methods (CS 331) — *KAUST Fall 2021*
- Convex Optimization — *OZON Masters Spring 2020*
- Optimization Methods (DIHT) — *MIPT Fall 2019*
- Machine Learning (DCAM) — *MIPT Spring 2019*

Tutor — *2014 – 2020*
Training of 7–11th grade students for high-school physics Olympiads

PAPERS

23. **Revisiting Stochastic Proximal Point Methods: Generalized Smoothness and Similarity**
    Zhirayr Tovmasyan, Grigory Malinovsky, Laurent Condat, Peter Richtárik
    arXiv:2502.03401, 2025

22. **Methods with Local Steps and Random Reshuffling for Generally Smooth Non-Convex Federated Optimization**
    Yury Demidovich, Petr Ostroukhov, Grigory Malinovsky, Samuel Horváth, Martin Takáč, Peter Richtárik, Eduard Gorbunov
    The 13th International Conference on Learning Representations, ICLR 2025
    arXiv:2412.02781, 2024

21. **Randomized Asymmetric Chain of LoRA: The First Meaningful Theoretical Framework for Low-Rank Adaptation**
Grigory Malinovsky, Umberto Michieli, Hasan Abed Al Kader Hammoud, Taha Ceritli, Hayder Elesedy, Mete Ozay, Peter Richtárik
arXiv:2410.08305, 2024

20. **MicroAdam: Accurate Adaptive Optimization with Low Space Overhead and Provable Convergence**
Ionut-Vlad Modoranu, Mher Safaryan, Grigory Malinovsky, Eldar Kurtic, Thomas Robert, Peter Richtárik, Dan Alistarh
38th Conference on Neural Information Processing Systems, NeurIPS 2024
arXiv:2405.15593, 2024

19. **Streamlining in the Riemannian Realm: Efficient Riemannian Optimization with Loopless Variance Reduction**
Yury Demidovich, Grigory Malinovsky, Peter Richtárik
arXiv:2403.06677, 2024

18. **MAST: Model-Agnostic Sparsified Training**
Yury Demidovich, Grigory Malinovsky, Egor Shulgin, Peter Richtárik
Workshop on Nonsmooth Optimization and Applications, NOPTA 2024
The 13th International Conference on Learning Representations, ICLR 2025
arXiv:2311.16086, 2023

17. **Byzantine Robustness and Partial Participation Can Be Achieved Simultaneously: Just Clip Gradient Differences**
Grigory Malinovsky, Peter Richtárik, Samuel Horváth, Eduard Gorbunov
Privacy Regulation and Protection in Machine Learning Workshop at ICLR 2024
38th Conference on Neural Information Processing Systems, NeurIPS 2024
arXiv:2311.14127, 2023

16. **Improving Accelerated Federated Learning with Compression and Importance Sampling**
Michał Grudzień, Grigory Malinovsky, Peter Richtárik
Federated Learning and Analytics in Practice: Algorithms, Systems, Applications, and Opportunities Workshop at ICML 2023
arXiv:2306.03240, 2023

15. **A Guide Through the Zoo of Biased SGD**
Yury Demidovich, Grigory Malinovsky, Igor Sokolov, Peter Richtárik
37th Conference on Neural Information Processing Systems, NeurIPS 2023
arXiv:2305.16296, 2023

14. **TAMUNA: Doubly Accelerated Federated Learning with Local Training, Compression, and Partial Participation**
Laurent Condat, Ivan Agarský, Grigory Malinovsky, Peter Richtárik
International Workshop on Federated Learning in the Age of Foundation Models in Conjunction with NeurIPS 2023, FL@FM-NeurIPS'23
arXiv:2302.09832, 2023

13. **Federated Learning with Regularized Client Participation**
Grigory Malinovsky, Samuel Horváth, Konstantin Burlachenko, Peter Richtárik
Federated Learning and Analytics in Practice: Algorithms, Systems, Applications, and Opportunities Workshop at ICML 2023
arXiv:2302.03662, 2023

12. **An Optimal Algorithm for Strongly Convex Min-min Optimization**
Dmitry Kovalev, Alexander Gasnikov, Grigory Malinovsky
arXiv:2212.14439, 2022

11. **Can 5th Generation Local Training Methods Support Client Sampling? Yes!**
Michał Grudzień, Grigory Malinovsky, Peter Richtárik
26th International Conference on Artificial Intelligence and Statistics, AISTATS 2023
arXiv:2212.14370, 2022

10. **Minibatch Stochastic Three Points Method for Unconstrained Smooth Minimization**
Soumia Boucherouite, Grigory Malinovsky, Peter Richtárik, El Houcine Bergou
The 38th AAAI Conference on Artificial Intelligence, AAAI 2024
arXiv:2209.07883, 2022

9. **Variance Reduced ProxSkip: Algorithm, Theory and Application to Federated Learning**
Grigory Malinovsky, Kai Yi, Peter Richtárik
36th Conference on Neural Information Processing Systems, NeurIPS 2022
arXiv:2207.04338, 2022

8. **Federated Optimization Algorithms with Random Reshuffling and Gradient Compression**
Abdurakhmon Sadiev, Grigory Malinovsky, Eduard Gorbunov, Igor Sokolov, Ahmed Khaled, Konstantin Burlachenko, Peter Richtárik
Federated Learning and Analytics in Practice: Algorithms, Systems, Applications, and Opportunities Workshop at ICML 2023
38th Conference on Neural Information Processing Systems, NeurIPS 2024
arXiv:2206.07021, 2022

7. **ProxSkip: Yes! Local Gradient Steps Provably Lead to Communication Acceleration! Finally!**
Konstantin Mishchenko, Grigory Malinovsky, Sebastian Stich, Peter Richtárik
39th International Conference on Machine Learning, ICML 2022
arXiv:2202.09357, 2022

6. **Server-Side Stepsizes and Sampling Without Replacement Provably Help in Federated Optimization**
Grigory Malinovsky, Konstantin Mishchenko, Peter Richtárik
4th International Workshop on Distributed Machine Learning, DistributedML 2023
NeurIPS 13th Annual Workshop on Optimization for Machine Learning, NeurIPS 2021
arXiv:2201.11066, 2022

5. **Federated Random Reshuffling with Compression and Variance Reduction**
Grigory Malinovsky, Peter Richtárik
International Workshop on Federated Learning for User Privacy and Data Confidentiality, ICML 2021
arXiv:2205.03914, 2022

4. **Averaged Heavy-Ball Method**
Marina Danilova, Grigory Malinovsky
Computer Research and Modeling, 2022, vol. 14, no. 2, pp. 277–308, Article
arXiv:2111.05430, 2021

3. **Random Reshuffling with Variance Reduction: New Analysis and Better Rates**
Grigory Malinovsky, Alibek Sailanbayev, Peter Richtárik
39th Conference on Uncertainty in Artificial Intelligence, UAI 2023
Spotlight at NeurIPS 13th Annual Workshop on Optimization for Machine Learning, NeurIPS 2021
arXiv:2104.09342, 2021

2. **Distributed Proximal Splitting Algorithms with Rates and Acceleration**
Laurent Condat, Grigory Malinovsky, Peter Richtárik
Spotlight at NeurIPS 12th Annual Workshop on Optimization for Machine Learning, NeurIPS 2020
Frontiers in Signal Processing, Section Signal Processing for Communications 2022, Article
arXiv:2010.00952, 2020

1. **From Local SGD to Local Fixed-Point Methods for Federated Learning**
Grigory Malinovsky, Dmitry Kovalev, Elnur Gasanov, Laurent Condat, Peter Richtárik
37th International Conference on Machine Learning, ICML 2020
arXiv:2004.01442, 2020

POSTERS AND TALKS

- **Poster: "MicroAdam: Accurate Adaptive Optimization with Low Space Overhead and Provable Convergence"**
Rising Stars in AI Symposium 2025
Thuwal, Saudi Arabia April 7-11, 2025

- **Poster: "Don't Compress Gradients in Random Reshuffling: Compress Gradient Differences"**
38th Annual Conference on Neural Information Processing Systems (NeurIPS 2024)
Vancouver, Canada, December 10-15, 2024

- **Poster: "Byzantine Robustness and Partial Participation Can Be Achieved Simultaneously: Just Clip Gradient Differences"**
38th Annual Conference on Neural Information Processing Systems (NeurIPS 2024)
Vancouver, Canada, December 10-15, 2024

- **Poster: "MicroAdam: Accurate Adaptive Optimization with Low Space Overhead and Provable Convergence"**
38th Annual Conference on Neural Information Processing Systems (NeurIPS 2024)
Vancouver, Canada, December 10-15, 2024

- **Talk: "Introduction to Federated Optimization"**
Samsung AI Reading Club
Staines, United Kingdom, July 30, 2024

- **Talk: "Byzantine Robustness and Partial Participation Can Be Achieved Simultaneously: Just Clip Gradient Differences"**
Federated Learning One World Seminar (FLOW)
Online, March 27, 2024

- **Poster: "Byzantine Robustness and Partial Participation Can Be Achieved Simultaneously: Just Clip Gradient Differences"**
Rising Stars in AI Symposium 2024 at KAUST
Thuwal, Saudi Arabia, February 21, 2024

- **Talk: "Server-side stepsizes and sampling without replacement provably help in federated optimization"**
4th International Workshop on Distributed Machine Learning
Paris, France, December 8, 2023

- **Poster: Random reshuffling with variance reduction: New analysis and better rates**
39th Conference on Uncertainty in Artificial Intelligence
Online, July 31 – August 4, 2023,

- **Talk: "Can 5th Generation Local Training Methods Support Client Sampling? Yes!"**
Third International Conference Mathematics in Armenia: Advances and Perspectives
Yerevan, Armenia, July 2–8, 2023

- **Talk: "ProxSkip and its Variations: 5th Generation of Local Training Methods in Federated Learning"**
  Google Research Seminar (invited by Zachary Charles)
  Online, June 8, 2023

- **Poster: "Can 5th Generation Local Training Methods Support Client Sampling? Yes!"**
  26th International Conference on Artificial Intelligence and Statistics
  Valencia, Spain, April 25–27, 2023

- **Poster: "Can 5th Generation Local Training Methods Support Client Sampling? Yes!"**
  Rising Stars in AI Symposium 2023 at KAUST
  Thuwal, Saudi Arabia, February 19, 2023

- **Talk: "On 5th Generation of Local Training Methods in Federated Learning"**
  MIPT Intelligent Systems Seminar
  Online, February 9, 2023

- **Talk: "ProxSkip: Breaking the Communication Complexity Barrier of Local Gradient Methods"**
  15th Viennese Conference on Optimal Control and Dynamic Games 2022
  Vienna, Austria, July 12–15, 2022

- **Talk: "ProxSkip: Yes! Local Gradient Steps Provably Lead to Communication Acceleration! Finally!"**
  EPFL Machine Learning and Optimization Laboratory Seminar
  Lausanne, Switzerland, July 3, 2022

- **Talk: "ProxSkip: Yes! Local Gradient Steps Provably Lead to Communication Acceleration! Finally!"**
  Weierstrass Institute for Applied Analysis and Stochastics
  Stochastic Algorithms and Nonparametric Statistics group Seminar
  Online, June 21, 2022

- **Talk: "ProxSkip: Yes! Local Gradient Steps Provably Lead to Communication Acceleration! Finally!"**
  CISPA Helmholtz Center for Information Security Seminar
  Saarbrücken, Germany, June 21, 2022

- **Talk: "ProxSkip: Yes! Local Gradient Steps Provably Lead to Communication Acceleration! Finally!"**
  UCL CORE (Yurii Nesterov's group) Optimization Seminar
  Louvain-la-Neuve, Belgium, June 1, 2022

- **Talk: "ProxSkip: Breaking the Communication Complexity Barrier of Local Gradient Methods"**
  All-Russian Optimization Seminar
  Online, April 20, 2022 [Video]

- **Talk: "Server-Side Stepsizes and Sampling Without Replacement Provably Help in Federated Optimization"**
  Federated Learning One World Seminar (FLOW)
  Online, April 6, 2022 [Video]

- **Talk: "ProxSkip: Breaking the Communication Complexity Barrier of Local Gradient Methods"**
  Rising Stars in AI Symposium 2022 at KAUST
  Thuwal, Saudi Arabia, March 13–15, 2022

- **Poster and Talk: "Better Linear Rates for SGD with Data Shuffling"**
  International OPT Workshop on Optimization for Machine Learning, NeurIPS 2021
  Online, December 13, 2021

- **Poster: "On Server-Side Stepsizes in Federated Optimization: Theory Explaining the Heuristics"**
  International OPT Workshop on Optimization for Machine Learning, NeurIPS 2021
  Online, December 13, 2021
- **Poster: "Federated Random Reshuffling with Compression and Variance Reduction"**
  International Workshop on Federated Learning for User Privacy and Data Confidentiality, ICML 2021
  Online, July 24, 2021
- **Poster and Talk: "Random Reshuffling with Variance Reduction New Analysis and Better Rates"**
  Conference "Optimization Without Borders"
  Sochi, Russia, July 12–18, 2021
- **Poster: "Random Reshuffling with Variance Reduction New Analysis and Better Rates"**
  Traditional Youth School "Control, Information and Optimization"
  Voronovo, Russia, June 10–17, 2021
- **Talk: "Random Reshuffling with Variance Reduction New Analysis and Better Rates"**
  KAUST Conference on Artificial Intelligence 2021
  Thuwal, Saudi Arabia, April 28–29, 2021 [Video]
- **Talk: "Determination of Data Complexity Using a Universal Approximating Model"**
  Mathematical Methods for Pattern Recognition: the 19th Russian National Conference with International Participation
  Moscow, Russia, November 26–29, 2019 [Book of abstracts]
- **Talk: "Averaged Heavy Ball Method"**
  62nd Scientific Conference at MIPT, Section "Data Analysis, Recognition and Prediction"
  Dolgoprudny, Russia, November 18–23, 2019
- **Poster: "Averaged Heavy Ball Method"**
  Traditional Youth School "Control, Information and Optimization"
  Voronovo, Russia, June 17–22, 2019

SKILLS

- Languages: Russian (native), English (fluent)
- Programming: Python, C, SQL Server, MATLAB (basic), R (basic)
- Python libraries: NumPy, SciPy, PyTorch, Matplotlib, SciKit-Learn, Pandas
- Software: Git, LaTeX, Microsoft Office

ACADEMIC SERVICE

Reviewer

- 42th International Conference on Machine Learning (Best Reviewer Award), ICML 2025
- 38th Conference on Neural Information Processing Systems, NeurIPS 2024
- Transactions on Machine Learning Research
- 41th International Conference on Machine Learning (Best Reviewer Award), ICML 2024
- 12th International Conference on Learning Representations, ICLR 2024
- 27th International Conference on Artificial Intelligence and Statistics, AISTATS 2024
- IEEE Transactions on Automatic Control
- 40th International Conference on Machine Learning, ICML 2023

- 11th International Conference on Learning Representations, ICLR 2023
- 26th International Conference on Artificial Intelligence and Statistics, AISTATS 2023
- 36th Conference on Neural Information Processing Systems (Top Reviewer Award), NeurIPS 2022
- 39th International Conference on Machine Learning, ICML 2022
- 25th International Conference on Artificial Intelligence and Statistics, AISTATS 2022
- 10th International Conference on Learning Representations, ICLR 2022
- 38th International Conference on Machine Learning, ICML 2021
- 35th Conference on Neural Information Processing Systems, NeurIPS 2021

Program Committee Member

- 2nd IEEE International Conference on Federated Learning Technologies and Applications, FLTA 2024
- International Workshop on Federated Learning and Analytics in Practice: Algorithms, Systems, Applications, and Opportunities Workshop, ICML 2023
- International Workshop on Federated Learning: Recent Advances and New Challenges, NeurIPS 2022
- International Workshop on Trustworthy Federated Learning, IJCAI 2022
- International Workshop on Trustable, Verifiable and Auditable Federated Learning, AAAI 2022
- International Workshop on Federated Learning for User Privacy and Data Confidentiality, ICML 2021

SUMMER SCHOOLS

Participant of Summer School "Statistics and Learning Theory"
Tsaghkadzor, Armenia, July 9–15, 2023

Participant of Traditional Youth School "Control, Information and Optimization"
Voronovo, Russia, June 10–17, 2021

Participant of Traditional Youth School "Control, Information and Optimization"
Voronovo, Russia, June 17–22, 2019

EXTRACURRICULAR ACTIVITIES

- Organizer of the OPT ML group Seminar *January 2022 – December 2022*
- Activist of academic department in Student Council *January 2019 – January 2020*
  Processing students' feedback on courses
- Organizer of high-school Olympiads in mathematics and physics *February 2016*

HOBBIES

fitness, martial arts, football, basketball, drums