

# GRIGORY MALINOVSKY

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[grigory-malinovsky.github.io](https://grigory-malinovsky.github.io)

Thuwal, Saudi Arabia

## EDUCATION

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<b>King Abdullah University of Science and Technology (KAUST)</b> PhD in Applied Mathematics and Computational Sciences Advisor: <a href="#">Peter Richtárik</a>	<i>January 2022 – Present</i> Thuwal, Saudi Arabia <b>GPA: 3.89/4.0</b>
<b>King Abdullah University of Science and Technology (KAUST)</b> MS in Applied Mathematics and Computational Sciences Advisor: <a href="#">Peter Richtárik</a>	<i>August 2020 – December 2021</i> Thuwal, Saudi Arabia <b>GPA: 3.82/4.0</b>
<b>Moscow Institute of Physics and Technology (MIPT)</b> BS in Applied Mathematics and Physics Advisor: <a href="#">Boris Polyak</a> Thesis: Averaged Heavy Ball Method	<i>September 2014 – July 2019</i> Dolgoprudny, Russia <b>GPA: 4.73/5.0</b>

## RESEARCH INTERESTS

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Federated Learning, Distributed Optimization, Stochastic Optimization, Machine Learning

## PAPERS

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- 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
- A Guide Through the Zoo of Biased SGD**  
Yury Demidovich, **Grigory Malinovsky**, Igor Sokolov, Peter Richtárik  
[arXiv:2305.16296](#), 2023
- TAMUNA: Doubly Accelerated Federated Learning with Local Training, Compression, and Partial Participation**  
Laurent Condat, Ivan Agarský, **Grigory Malinovsky**, Peter Richtárik  
[arXiv:2302.09832](#), 2023
- 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
- An Optimal Algorithm for Strongly Convex Min-min Optimization**  
Dmitry Kovalev, Alexander Gasnikov, **Grigory Malinovsky**  
[arXiv:2212.14439](#), 2022
- 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  
[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](#)*  
[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  
*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

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

## SCHOLARSHIPS, HONORS AND AWARDS

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- **CEMSE Dean’s List Award** for high 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**”  
*Thuwal, Saudi Arabia, 2022*
- **CEMSE Academic Excellence Award** for high academic results at KAUST (\$2,500 cash prize)  
*Thuwal, Saudi Arabia, 2022*
- **Progress Towards PhD** Rated as “**Outstanding**”  
*Thuwal, Saudi Arabia, 2021*
- **CEMSE Research Excellence Award** for high 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 (\$180 monthly during 5 months)  
*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*

## RESEARCH VISITS

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<b>CISPA Helmholtz Center for Information Security</b> Saarland University I worked with <a href="#">Sebastian Stich</a>	<i>June 2022</i> Saarbrücken, Germany
<b>Moscow Institute of Physics and Technology</b> Machine Intelligence Laboratory I worked with <a href="#">Ilya Zharikov</a>	<i>June – August 2021</i> Dolgoprudny, Russia
<b>King Abdullah University of Science and Technology</b> Visual Computing Center Internship in the group of <a href="#">Peter Richtárik</a>	<i>January – February 2020</i> Thuwal, Saudi Arabia

## INDUSTRIAL EXPERIENCE

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<b>MIPT Research Project</b> Junior Researcher Non-Convex Optimization in Digital Pre-Distorter Development	<i>January – July 2020</i> Moscow, Russia
<b>Tinkoff Summer Internship</b> Data Analyst Customer Classification	<i>July 2017</i> Moscow, Russia

## TEACHING

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<b>Teaching Assistant</b>	
• TAHAKOM Federated Learning course	<i>KAUST Fall 2023</i>
• Graduate Seminar (CS 398)	<i>KAUST Spring 2023</i>

- 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*
- Robust and Stochastic Optimization *OZON Masters Spring 2021*
- Online Optimization *OZON Masters Fall 2020*
- Convex Optimization *OZON Masters Spring 2020*
- Optimization Methods (DIHT) *MIPT Fall 2019*
- Machine Learning (DCAM) *MIPT Spring 2019*

### **Tutor**

*2014 – 2022*

Training of 7–11th grade students for high-school physics Olympiads

### **SKILLS**

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- 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**

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#### **Reviewer**

- 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**

- 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

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**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

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

## HOBBIES

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fitness, martial arts, football, basketball