Kaja Gruntkowska

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Education

01/2024–Present	PhD in Statistics specialization: Machine Learning and Optimization , <i>King Abdullah University of Science and Technology (KAUST)</i> , Thuwal, Saudi Arabia
	Supervisor: Prof. Peter Richtárik
10/2022-09/2023	MSc in Statistical Science, University of Oxford, Oxford, United Kingdom
	Grade: Distinction
	Dissertation: Byzantine-Robust and Communication-Efficient Distributed Learning
	Supervisors: Prof. Patrick Rebeschini, Prof. Yee Whye Teh, Prof. Peter Richtárik
10/2019-07/2022	BSc in Mathematics and Statistics, University of Warwick, Coventry, United Kingdom
	Grade: First Class Honours
	Ranked 2nd in the Statistics student cohort; 91.8%, 86.8%, 88.5% yearly grade averages
	Awards
05/2025	Nomination for 2025 Google PhD fellowship program , <i>KAUST</i> Selected universities may nominate up to 3 students annually.
12/2024	Al-Kindi Research Award, KAUST
	Awarded to top 3 students in the Statistics department for exceptional research impact.
09/2024	Nomination for 2025 Apple Scholars in AIML, KAUST
	Selected universities may nominate up to 3 students annually.
06/2024	Dean's List Award, KAUST
	Awarded to top PhD students in the Computer, Electrical and Mathematical Science and Engineering (CEMSE) division for exceptional academic achievements.
01/2024	Dean's Award, KAUST
	Awarded to top incoming students.
09/2023	Worcester College Prize, University of Oxford
	Awarded for performance in final examinations.
09/2022	Outstanding Overall Performance Prize, University of Warwick
	Awarded to top 2 students in the Statistics department.
09/2022	Academic Excellence Prize, University of Warwick
	Awarded to top 3 students in the Statistics department.
	Publications and Preprints
2025	Artem Riabinin, Egor Shulgin, Kaja Gruntkowska, Peter Richtárik. Gluon: Making

2025 Artem Riabinin, Egor Shulgin, Kaja Gruntkowska, Peter Richtárik. Gluon: Making Muon & Scion Great Again! (Bridging Theory and Practice of LMO-based Optimizers for LLMs). arXiv:2502.02002.

- 2025 **Kaja Gruntkowska**, Hanmin Li, Aadi Rane, Peter Richtárik. *The Ball-Proximal* (="Broximal") Point Method: a New Algorithm, Convergence Theory, and Applications. arXiv:2502.02002.
- 2024 Wojciech Anyszka, Kaja Gruntkowska, Alexander Tyurin, Peter Richtárik. *Tighter Performance Theory of FedExProx.* arXiv:2410.15368.
- 2024 Kaja Gruntkowska, Alexander Tyurin, Peter Richtárik. Improving the Worst-Case Bidirectional Communication Complexity for Nonconvex Distributed Optimization under Function Similarity. arXiv:2402.06412. Spotlight at NeurIPS 2024.
- 2024 Alexander Tyurin, **Kaja Gruntkowska**, Peter Richtárik. *Freya PAGE: First Optimal Time Complexity for Large-Scale Nonconvex Finite-Sum Optimization with Heterogeneous Asynchronous Computations*. arXiv:2405.15545. **NeurIPS 2024**.
- 2024 Ahmad Rammal, **Kaja Gruntkowska**, Nikita Fedin, Eduard Gorbunov, Peter Richtárik. *Communication Compression for Byzantine Robust Learning: New Efficient Algorithms and Improved Rates.* arXiv:2310.09804. **AISTATS 2024**.
- 2023 Kaja Gruntkowska, Alexander Tyurin, Peter Richtárik. *EF21-P and Friends: Improved Theoretical Communication Complexity for Distributed Optimization with Bidirectional Compression.* arXiv:2209.15218. **ICML 2023**.

Talks and Presentations

- 05/2025 Stochastic Numerics and Statistical Learning: Theory and Applications Workshop 2025, KAUST, Thuwal, Saudi Arabia Poster: The Ball-Proximal (="Broximal") Point Method: a New Algorithm, Convergence Theory, and Applications
- 05/2025 LANS Seminar, Argonne National Laboratory, Lemont, United States Talk: Improving the worst-case bidirectional communication complexity for nonconvex distributed optimization under function similarity
- 04/2025 **Optimization Seminar**, *Beijing Institute of Mathematical Sciences and Applications*, Beijing, China

Talk: Improving the worst-case bidirectional communication complexity for nonconvex distributed optimization under function similarity

- 04/2025 Center for ML Research Seminar, Peking University, Beijing, China Talk: Freya PAGE: First optimal time complexity for large-scale nonconvex finite-sum optimization with heterogeneous asynchronous computations
- 04/2025 Academic Report of the School of Mathematical Sciences, Beihang University, Beijing, China

Talk: Improving the worst-case bidirectional communication complexity for nonconvex distributed optimization under function similarity

04/2025 Institute for Interdisciplinary Information Sciences Lecture Series, Tsinghua University, Beijing, China

> **Talk**: Freya PAGE: First optimal time complexity for large-scale nonconvex finite-sum optimization with heterogeneous asynchronous computations

- 04/2025 Rising Stars in Al Symposium, KAUST, Thuwal, Saudi Arabia Poster: The Ball-Proximal (="Broximal") Point Method: a New Algorithm, Convergence Theory, and Applications
- 03/2025 AMCS/STAT Graduate Seminar, KAUST, Thuwal, Saudi Arabia Talk: The Ball-Proximal (="Broximal") Point Method: a New Algorithm, Convergence Theory, and Applications

12/2024	 Applied Mathematics School, KAUST, Thuwal, Saudi Arabia Talk: Freya PAGE: First Optimal Time Complexity for Large-Scale Nonconvex Finite-Sum Optimization with Heterogeneous Asynchronous Computations Designed and conducted a hands-on programming tutorial
07/2024	Eastern European Machine Learning Summer School , Novi Sad, Serbia Poster : Improving the Worst-Case Bidirectional Communication Complexity for Nonconvex Dis- tributed Optimization under Function Similarity
06/2024	Applied Algorithms for Machine Learning: A Workshop on Future of Computa- tion, Paris, France Poster: Improving the Worst-Case Bidirectional Communication Complexity for Nonconvex Dis- tributed Optimization under Function Similarity
05/2024	Stochastic Numerics and Statistical Learning: Theory and Applications Work- shop 2024, <i>KAUST</i> , Thuwal, Saudi Arabia Poster: Improving the Worst-Case Bidirectional Communication Complexity for Nonconvex Dis-
02/2024	tributed Optimization under Function Similarity Rising Stars in Al Symposium , KAUST, Thuwal, Saudi Arabia Poster : Communication Compression for Byzantine Robust Learning: New Efficient Algorithms and Improved Rates
05/2023	Learning Theory and Statistical Optimization Seminar , <i>University of Oxford</i> , Oxford, United Kingdom Talk : <i>Distributed Optimization with Bidirectional Compression</i>
03/2023	Optimisation and Numerical Analysis Seminar , <i>University of Birmingham</i> , Birmingham, United Kingdom Talk : <i>EF21-P and Friends</i> : <i>Improved Theoretical Communication Complexity for Distributed Optimization with Bidirectional Compression</i>
	Experience
09/2023-12/2023	Research Intern (remote) , <i>KAUST</i> , Optimization and ML Lab Prof. Peter Richtárik, Thuwal, Saudi Arabia Project on distributed optimization – paper accepted to NeurIPS 2024
06/2022-09/2022	Research Intern , <i>KAUST</i> , Optimization and ML Lab Prof. Peter Richtárik, Thuwal, Saudi Arabia
06/2020-08/2020	Intern, UNIQA Insurance Group, Lodz, Poland Interned in Business Support and Procurement Department
	Teaching
01/2025-05/2025	Teaching Assistant , <i>KAUST</i> , Thuwal, Saudi Arabia CS 331: Stochastic Gradient Descent Methods
	Additional Activities
	Reviewing International Conference on Artificial Intelligence and Statistics (AISTATS) 2024, 2025, International Conference on Machine Learning (ICML) 2024, 2025, International Con-

International Conference on Artificial Intelligence and Statistics (AISTATS) 2024, 2025, International Conference on Machine Learning (ICML) 2024, 2025, International Conference on Learning Representations (ICLR) 2025, Conference on Neural Information Processing Systems (NeurIPS) 2025, IEEE Transactions on Signal Processing, Journal of Machine Learning Research, Foundations and Trends in Optimization, OPT 2024 – NeurIPS Workshop

Research Visits, Workshops and Summer Schools

- 04/2025 **Research visit to Prof. Yi-Shuai Niu**, *Beijing Institute of Mathematical Sciences and Applications (BIMSA)*, Beijing, China
 - \circ $\;$ Delivered invited talks at 4 universities
 - \circ $\;$ Collaborated on a project on communication-efficient optimization
- 07/2024 Eastern European Machine Learning Summer School, Novi Sad, Serbia
- 06/2024 Applied Algorithms for Machine Learning: A Workshop on Future of Computation, Paris, France

Volunteering

- 09/2021–07/2022 **Student Staff Liaison Committee**, *University of Warwick*, Coventry, United Kingdom Collaborated with university faculty to evaluate and propose enhancements to teaching strategies and student support services within the Department of Statistics
- 09/2020–07/2021 **Mentoring Program Coordinator**, *University of Warwick*, Coventry, United Kingdom Collaborated with staff and students to improve the Department of Statistics mentoring scheme