Kalina Hristova Petrova

Office Building West, Am Campus 1, 3400 Klosterneuburg, Austria
+41 78 734 57 55 | kalina.petrova@ist.ac.at
Nationality: Bulgarian | Birth date: 13.10.1994

EDUCATION

09.2019 – 05.2024 **Swiss Federal Institute of Technology (ETHZ), Zurich, Switzerland**
PhD in Theoretical Computer Science
Advisor: Prof. Dr. Angelika Steger

09.2017 – 06.2019 **Swiss Federal Institute of Technology (ETHZ), Zurich, Switzerland**
Master of Science in Computer Science, track: Theoretical Computer Science
GPA: 5.91 out of 6.00

09.2013 – 06.2017 **Princeton University, Princeton, New Jersey, USA**
Bachelor of Science in Engineering in Computer Science
GPA: 3.93 out of 4.00, Summa Cum Laude

WORK EXPERIENCE

06.2024 – present **Postdoctoral researcher at Institute of Science and Technology Austria (ISTA), Vienna, Austria**
IST-BRIDGE fellowship holder

- Conducted research in probabilistic and extremal combinatorics under the mentorship of Prof. Dr. Matthew Kwan

05.2019 – 08.2019 **Software Engineering Intern at Google Zurich, Switzerland**

- Generated datasets for evaluating Machine Learning models for the Google Ads team
- Analyzed the results of this evaluation and provided recommendations for the future work of the team

07.2014 – 08.2014 **Student Mentor/Lecturer at Summer Research School in Mathematics and Informatics, Bulgaria**

- Mentored three student research projects in Computer Science
- Gave a lecture to the Bulgarian extended national team for the International Olympiad in Informatics

TEACHING

12.2024 – 01.2025 Lecturer for **Topics in Ramsey theory**, Institute of Science and Technology Austria (ISTA)

09.2023 – 12.2023 Creator of exercises for **Advanced algorithms**, ETH Zurich

03.2020 – 05.2024 Teaching assistant for **Algorithms and probability**, ETH Zurich (5 times)

03.2020 – 05.2024 Supervisor for **Seminar on randomized algorithms and probabilistic methods**, ETH Zurich (4 times)

09.2019 – 02.2024 Teaching assistant for **Algorithms lab**, ETH Zurich (5 times)

09.2019 – 02.2023 Exam grader for **Randomized algorithms and probabilistic methods**, ETH Zurich (3 times)

02.2017 – 07.2017 Creator of lecture notes for **Linear locally decodable codes**, Princeton University

STUDENT SUPERVISION

02.2024 – 05.2024 Jonas Lill, Bachelor thesis, "Parameterized Algorithm for Max-Cut in Multigraphs", ETH Zurich

09.2023 – 12.2023 Andor Vári-Kakas, semester project on size-Ramsey numbers of hypertrees, ETH Zurich

02.2023 – 06.2023 Patryk Morawski, semester project, "Randomly perturbed digraphs also have bounded-degree spanning trees", ETH Zurich

04.2022 – 10.2022 Christopher Burckhardt, Bachelor thesis, "Analysis of weight bounded and restricted non-preemptive tree packing", ETH Zurich

09.2020 – 03.2021 Erik Jahn, Master thesis, "Sample-efficient learning with neural tuning curves", ETH Zurich

12.2019 – 06.2020 Nina Laura Corvelo Benz, Master thesis, "Using inhibitory signals for error encodings in networks with tuning curves", ETH Zurich

10.2019 – 04.2020 Robert Meier, Master thesis, "Immediate plasticity and adaptive tuning yield optimal sample efficiency in learning", ETH Zurich

OUTREACH

10.2018 – 05.2024	Volunteer lecturer as part of the Swiss Olympiad in Informatics
06.2021	Guide at the European Girls' Olympiad in Informatics
10.2016 – 05.2017	Volunteer teacher, Mathematics for underprivileged high school students, STEMCivics Purplefect Palace High School, Ewing Township, New Jersey, USA
09.2012 – 05.2018	Mentor of two high-school students for their research projects for High School Student Institute of Mathematics and Informatics conferences in Bulgaria, among which • On a special case of the bin packing problem • Computing unsigned reversal distance between genetic sequences using genetic algorithms • A new genetic algorithm for the 3-dimensional matching problem

AWARDS AND DISTINCTIONS

2024	IST-BRIDGE Fellow, Institute of Science and Technology Austria (ISTA)
2017	Recipient of Excellence Scholarship & Opportunity Programme (ESOP), ETH Zurich
2017	Sigma Xi Award for Outstanding Undergraduate Researcher for research done at Princeton University
2017	Participation in the ACM Intercollegiate Programming Contest, World Finals 2017 in Rapid City, USA
2017	Honorable Mention for the Computing Research Association's Outstanding Undergraduate Researcher Award for research done at Princeton University
2017	Elected to membership in the Society of Sigma Xi: The Scientific Research Honor Society
2017	Elected to membership in the Phi Beta Kappa Society for academic excellence
2016	1st place in a team of 3 out of 48 teams at the Regional ACM International Collegiate Programming Contest 2016, Greater New York region, New York, USA
2016	Winner of the Accenture Prize for Academic Excellence in Computer Science at Princeton University
2015	Awarded the Shapiro Prize for Academic Excellence at Princeton University
2015	2nd place in a team of 3 out of 49 teams at the Regional ACM International Collegiate Programming Contest 2015, Greater New York region, New York, USA

LANGUAGES

Bulgarian	Native	**German**	B2
English	C1	**French**	B1

TALKS

08.2025	Random Structures & Algorithms conference, TU Wien
07.2025	Extremal and Probabilistic Combinatorics Workshop, International Centre for Mathematical Sciences
05.2025	Discrete Mathematics Seminar, University of Passau
09.2021 – 05.2025	Mittagsseminar, ETH Zurich, 7 talks in total
12.2024	Graz Combinatorics Seminar, TU Graz
11.2024	DIMEA Combinatorial Potluck 2024, Masaryk University
09.2024	Combinatorial Mathematics Society of Australasia seminar, online
05.2024	Theoretical Computer Science & Discrete Mathematics Research Seminar, University of Heidelberg
03.2024	A Spring Day of Combinatorics, University of Birmingham
09.2023	Constructive and Probabilistic Methods in Combinatorics workshop, University of Zagreb
06.2023	Random Structures & Algorithms conference, Carnegie Melon University
10.2022	Seminar on Combinatorics, Games and Optimisation, London School of Economics
08.2022	Random Structures & Algorithms conference, Institute of European culture in Gniezno
01.2022	Research Seminar in Combinatorics, FU Berlin, online
07.2019	International Colloquium on Automata, Languages and Programming, University of Patras

RESEARCH INTERESTS

- Probabilistic and Extremal Combinatorics
- Random Graphs
- Ramsey Theory
- Combinatorial Design Theory
- Algorithms and Data Structures

JOURNAL PUBLICATIONS

- S. Boyadzhiyska, S. Das, T. Lesgourgues, and K. Petrova, "Odd-Ramsey numbers of complete bipartite graphs", *European Journal of Combinatorics* 131 (2026), p. 104235
- N. Draganić and K. Petrova, "Size-Ramsey numbers of graphs with maximum degree three", *Journal of the London Mathematical Society* 111 (3), e70116, 2025.
- J. Lill, K. Petrova, and S. Weber, "Linear-time MaxCut in multigraphs parameterized above the Poljak-Turzík bound", *Algorithmica* 87, 983-1007 (2025).
- M. Christoph, K. Petrova, and R. Steiner, "A note on digraph splitting", *Combinatorics, Probability and Computing* (2025), 1-6.
- Y. Pehova and K. Petrova, "Embedding loose spanning trees in 3-uniform hypergraphs", *Journal of Combinatorial Theory, Series B*, 168, 47-67, 2024.
- J. Lengler, A. Martinsson, K. Petrova, P. Schinder, R. Steiner, S. Weber, and E. Welzl, "On connectivity in random graph models with limited dependencies", *Random Structures & Algorithms*, 65 (2), 411-448, 2024.
- K. Petrova and M. Trujić, "Transference for loose Hamilton cycles in random 3-uniform hypergraphs", *Random Structures & Algorithms* 65 (2), 313-341, 2024.

CONFERENCE PUBLICATIONS

- K. Lakis, J. Lengler, K. Petrova, and L. Schiller. "Improved Bounds for Graph Distances in Scale Free Percolation and Related Models", *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques (APPROX/RANDOM 2024)*, Schloss Dagstuhl–Leibniz-Zentrum für Informati, 2024, pp. 74–1.
- J. Lengler, A. Martinsson, K. Petrova, P. Schnider, R. Steiner, S. Weber, and E. Welzl, "On connectivity in random graph models with limited dependencies", *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques (APPROX/RANDOM 2023)*, Vol. 275, Schloss Dagstuhl–Leibniz-Zentrum für Informatik, 2023, 30:1–30:22.
- Y. Pehova and K. Petrova, "Minimum vertex degree conditions for loose spanning trees in 3-graphs", *European Conference on Combinatorics, Graph Theory and Applications 2023*, pp. 754–759.
- B. Haeupler, F. Kuhn, A. Martinsson, K. Petrova, and P. Pfister. "Optimal strategies for patrolling fences", *Proceedings of the 46th International Colloquium on Automata, Languages, and Programming (ICALP 2019),* Vol. 132, Schloss Dagstuhl–Leibniz-Zentrum für Informatik, 2019, 144:1–144:13.
- K. Petrova and R. Tarjan. "A dynamic data structure for segment intersection queries", *Fifteenth International Workshop on Algebraic and Combinatorial Coding Theory (ACCT 2016)*, 2016, pp. 244–249.

PREPRINTS

- M. Kwan, K. Petrova, and M. Sawhney, "Parities in random Latin squares", submitted September 2025.
- R. Montgomery, K. Petrova, A. Ranganathan, and J. Tan, "Packing subdivisions into regular graphs", submitted August 2025.
- T. Makai, M. Pasch, K. Petrova, and L. Schiller, "Sharp thresholds for higher powers of Hamilton cycles in random graphs", submitted February 2025.
- M. Christoph, R. Nenadov, and K. Petrova, "The Hamilton space of pseudorandom graphs", submitted February 2024.
- N. Draganić, M. Kaufmann, D. Munhá Correia, K. Petrova, and R. Steiner, "Size-Ramsey numbers of structurally sparse graphs", submitted September 2023.
- P. Morawski and K. Petrova, "Randomly perturbed digraphs also have bounded-degree spanning trees", submitted June 2023.

THESES

- "Embedding Large Structures in Adversarially Modified Graphs and Hypergraphs" – Doctoral thesis, ETH Zurich, 2024, under the supervision of Prof. Dr. Angelika Steger.
- "Parallel variational autoencoders for image segmentation" – Master thesis, ETH Zurich, 2019, under the supervision of Prof. Dr. Angelika Steger, Asier Mujika, and Frederik Benzing.
- "A dynamic data structure for segment intersection queries" – Bachelor independent work, Princeton University, 2016, under the supervision of Prof. Dr. Robert Tarjan.