

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
- 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

- 09.2023 – 12.2023 Creation of exercises for Advanced algorithms, ETH Zurich
- 03.2020 – 05.2024 Teaching assistant for Algorithms and probability, spring semester, ETH Zurich
- 09.2019 – 02.2024 Teaching assistant for Algorithms lab, fall semester, ETH Zurich
- 02.2017 – 07.2017 Creation 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

- 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 Elected to membership in the Tau Beta Pi National Engineering Society, USA
- 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

- 09.2024 Combinatorial Mathematics Society of Australasia seminar, online
- 09.2021 – 05.2024 Mittagsseminar, ETH Zurich, 6 talks in total
- 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

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

PUBLICATIONS

- K. Lakis, J. Lengler, K. Petrova, 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)*.
- Y. Pehova and K. Petrova, "Embedding loose spanning trees in 3-uniform hypergraphs", *Journal of Combinatorial Theory, Series B*, 168, 47-67.
- 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.
- K. Petrova and M. Trujić, "Transference for loose Hamilton cycles in random 3-uniform hypergraphs", *Random Structures & Algorithms* 65 (2), 313-341.
- B. Haeupler, F. Kuhn, A. Martinsson, K. Petrova, and P. Pfister, "Optimal strategies for patrolling fences", *International Colloquium on Automata, Languages and Programming 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, Albená, Bulgaria, June 18-24, 2016. Proceedings*, 2016, 244-249.
- R. Dangovski and K. Petrova, "Self-avoiding walks in the plane", *Union of Bulgarian Mathematicians* 41.1 (2012): 152-157.

PREPRINTS

- S. Boyadzhiyska, S. Das, T. Lesgourgues, K. Petrova, "Odd-Ramsey numbers of complete bipartite graphs", submitted October 2024.
- J. Lill, K. Petrova, S. Weber, "Linear-time MaxCut in multigraphs parameterized above the Poljak-Turzík bound", submitted June 2024.
- M. Christoph, R. Nenadov, K. Petrova, "The Hamilton space of pseudorandom graphs", submitted February 2024.
- M. Christoph, K. Petrova, and R. Steiner, "A note on digraph splitting", submitted October 2023.
- 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.
- N. Draganić and K. Petrova, "Size-Ramsey numbers of graphs with maximum degree three", submitted August 2022.

RESEARCH INTERESTS

- Probabilistic and Extremal Combinatorics
- Random Graphs
- Ramsey Theory
- Combinatorial Design Theory
- Theory of Algorithms
- Randomized Algorithms