RUSTAM LATYPOV

Sublinear Algorithms Group
Aalto University, Finland

A fourth-year PhD student, advised by Jara Uitto. I am broadly interested in algorithm design and combinatorics. My specific research interests lie in the mathematical foundations of distributed and parallel computing. So far, my work has mainly focused on graph coloring and connectivity problems in different parallel models of computation.

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EDUCATION

- **Doctoral Candidate** · Computer Science — Jun 2021 –
  Sublinear Algorithms Group, Supervised by Prof. Jara Uitto — *Aalto University*
  Funded by the CS department's competitive funding grant
- **Master of Science** · Mathematics and Operations Research · GPA 4.9/5 — 2019 – 2021
  Major in Applied Mathematics · 5/5 — *Aalto University*
  Minor in Computer Science · 4.8/5
  rustamlatypov/masters-thesis
- **Bachelor of Science** · Engineering Physics and Mathematics · GPA 4.9/5 — 2016 – 2019
  Major in Mathematics and Systems Analysis · 5/5 — *Aalto University*
  Minor in Computer Science · 5/5
  rustamlatypov/bachelors-thesis

ACADEMIC ACTIVITY

Publications (authors in alphabetical order, as is standard in the field)

- Near-Optimal Directed Low-Diameter Decompositions [doi, arXiv]
  Karl Bringmann, Nick Fischer, Bernhard Haeupler, Rustam Latypov
  International Colloquium on Automata, Languages, and Programming (ICALP) 2025
- A Simple Parallel Algorithm with Near-Linear Work for Negative-Weight Single-Source Shortest Paths [doi, arXiv]
  Nick Fischer, Bernhard Haeupler, Rustam Latypov, Antti Roeyskoe, Aurelio Sulser
  SIAM Symposium on Simplicity in Algorithms (SOSA) 2025
- Adaptive Massively Parallel Coloring in Sparse Graphs [doi, arXiv]
  Rustam Latypov, Yannic Maus, Shreyas Pai, Jara Uitto
  ACM Symposium on Principles of Distributed Computing (PODC) 2024
- Conditionally Optimal Parallel Coloring of Forests [doi, arXiv]
  Christoph Grunau, Rustam Latypov, Yannic Maus, Shreyas Pai, Jara Uitto
  International Symposium on Distributed Computing (DISC) 2023

- Adaptive Massively Parallel Connectivity in Optimal Space [video, doi, arXiv]
  Rustam Latypov, Jakub Lacki, Yannic Maus, Jara Uitto
  ACM Symposium on Parallelism in Algorithms and Architectures (SPAA) 2023

- Fast Dynamic Programming in Trees in the MPC Model [doi, arXiv]
  Chetan Gupta, Rustam Latypov, Yannic Maus, Shreyas Pai, Simo Särkkä, Jan Studený, Jukka Suomela, Jara Uitto, Hossein Vahidi
  ACM Symposium on Parallelism in Algorithms and Architectures (SPAA) 2023

- Optimal Deterministic Massively Parallel Connectivity on Forests [doi, arXiv]
  Alkida Balliu, Rustam Latypov, Yannic Maus, Dennis Olivetti, Jara Uitto
  ACM-SIAM Symposium on Discrete Algorithms (SODA) 2023

- Exponential Speedup Over Locality in MPC with Optimal Memory [journal, doi, arXiv]
  Alkida Balliu, Sebastian Brandt, Manuela Fischer, Rustam Latypov, Yannic Maus, Dennis Olivetti, Jara Uitto
  International Symposium on Distributed Computing (DISC) 2022

- BA: Memory Efficient Massively Parallel Algorithms for LCL Problems on Trees [video, doi, arXiv]
  Sebastian Brandt, Rustam Latypov, Jara Uitto
  International Symposium on Distributed Computing (DISC) 2021

- Coloring Trees in Massively Parallel Computation [arXiv]
  Rustam Latypov, Jara Uitto
  CoRR 2021.

Teaching at Aalto University

- Advanced Course in Algorithms – Fall 2022, Fall 2023 (Head TA) [link]
- Principles of Algorithmic Techniques – Fall 2021, Fall 2025 (TA) [link]

Reviewed for SODA'26, FOCS'25, PODC'25, DISC'24, ICALP'24, SWAT'24, ITCS'24, PODC'23, DISC'23, PODC'22, DISC'22, DISC'21, OPODIS'20

Supervised Hannes Sederholm (MSc thesis)

AWARDS (2021-2024)

- Awarded 5000€ – Encouragement grant, The Finnish Foundation for Technology Promotion [link]
- Awarded 5000€ – Nokia Scholarship, Nokia Foundation [link]
- Granted 24-month funding for my doctoral studies (out of 20 applicants) – Dept. of CS, Aalto [link]
- Awarded 1000€ for academic success in mathematics – Professor E. J. Nyström Fund [link]
- Awarded 3 × 500€ for general academic success – School of Science, Aalto [link]

WORK EXPERIENCE

- **Doctoral candidate** · Aalto University Jun 2021 –
  Interested in the mathematical foundations of distributed and parallel computing. So far, my work has mainly focused on graph coloring and connectivity problems in different parallel models of computation.

- **Research assistant** · Aalto University Mar 2020 – May 2021
  Worked on distributed graph algorithms in the Massively Parallel Computation model. Developed and published a state-of-the-art graph coloring algorithm (Master's thesis).

- **Giant Leap Intern** · Vaisala Oyj Jun – Aug 2019
  Developed software that successfully forecasted test failures in large scale radiosonde production using data mining, feature engineering and machine learning (XGBoost, Python).

- **Research assistant** · Aalto University Jun – Aug 2018
  Studied ill-posed non-linear inverse problems for resistor networks both symbolically and numerically (Bachelor's thesis).

PROGRAMMING PROJECTS – github.com/rustamlatypov

- **Parallel matrix multiplication** C++
  Parallel (CPU) matrix multiplication achieving 500-fold speedup w.r.t. sequential

- **Tile-matching game** C++
  Tournament grade Tetris and Pentis with controls in accordance with the Super Rotation System

- **Parallel radix sort** Scala
  Sequential and parallel (CPU) LSD radix sorts achieving 5- and 15-fold speedups w.r.t. scala.quickSort

- **Inverse problem for resistor networks** MATLAB
  Solving non-linear, ill-posed inverse problems for resistor networks both symbolically and numerically

- **Machine learning classifier for music genres** Python
  Solving a skewed, multiclass music genre classification problem with supervised PCA and SVM

- **Parallel password cracker** Python
  A command-line tool for cracking passwords in parallel (CPU) using dictionary and hybrid attacks