# RUSTAM LATYPOV

**Doctoral Candidate · Theoretical Computer Science**
**Aalto University, Finland**

A third-year PhD student, advised by Prof. Jara Uitto. My interests lie in the mathematical foundations of distributed and parallel computing, with an emphasis on the Massively Parallel Computation (MPC) model. Current research revolves around connectivity and coloring problems.

rustamlatypov.github.io rustam.latypov@aalto.fi

## EDUCATION

- **Doctoral Candidate** · Aalto University — Jun 2021 –
  Theoretical Computer Science Group
  Supervisor: Prof. Jara Uitto
  Funded by the CS department's competitive funding grant

- **Master of Science** · Aalto University · GPA 4.9/5 — 2019 – 2021
  Mathematics and Operations Research
  Major: Applied Mathematics · 5/5 Minor: Computer Science · 5/5
  github.com/rustamlatypov/masters-thesis

- **Bachelor of Science** · Aalto University · GPA 4.9/5 — 2016 – 2019
  Engineering Physics and Mathematics
  Major: Mathematics and Systems Analysis · 5/5 Minor: Computer Science · 5/5
  github.com/rustamlatypov/bachelors-thesis

## ACADEMIC ACTIVITY

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

- Adaptive Massively Parallel Coloring in Sparse Graphs [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, and 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 [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

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

**Reviewer (at)** SWAT'24, ICALP'24, ITCS'23, SPAA'23, PODC'23, DISC'22, PODC'22, DISC'21, OPODIS'20

## AWARDS (2021-2024)

- 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 500€ + 2 × 500€ for general academic success – School of Science, Aalto [link] [link]

## WORK EXPERIENCE

- **Doctoral candidate** · Aalto University Jun 2021 –
  Charting the complexity landscape of fundamental graph problems, and exploring the algorithmic applications of powerful probabilistic tools in the context of Massively Parallel Computation.

- **Research assistant** · Aalto University Mar 2020 – May 2021
  Worked on distributed graph algorithms in low-space Massively Parallel Computation. Developed a deterministic, state-of-the-art 3-coloring algorithm for trees (Master's thesis, see manuscript below).

- **Giant Leap Intern** · Vaisala Oyj Jun – Aug 2019
  Developed software for forecasting 20% of the test failures in large scale radiosonde production using data mining, feature engineering and machine learning (XGBoost, Python).

- **Research assistant** · Aalto University Jun – Aug 2018
  Solved non-linear, ill-posed inverse problems for resistor networks both symbolically and numerically using the Gauss-Newton algorithm and Tikhonov regularization (Bachelor's thesis, see project below).

## 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