

Sander Borst

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Personal Profile

Hi, I am Sander Borst. I am a PhD student in theoretical computer science at CWI in Amsterdam, advised by Daniel Dadush. I am fascinated by solving hard problems. Currently I work on topics related to online algorithms, integer programming and discrepancy theory.

Education

PhD in Theoretical Computer Science

Amsterdam, The Netherlands

Centrum Wiskunde & Informatica (CWI)

Feb 2020 - Current

- PhD advisor: Daniel Dadush.
- Working on projects related to integer programming, online algorithms and discrepancy theory.
- Organizer of the Networks & Optimization seminar at CWI.
- Completed the PhD program of the Dutch Network of Mathematics for Operations Research (LNMB), consisting of the courses:
 - Algorithmic Game Theory
 - Robust Optimization
 - Networks and Semidefinite Programming
 - Multi-class Queues and Stochastic Networks
 - Markov Decision Processes
 - Algorithmic Mechanism Design
 - Randomized Algorithms

MSc Applied Mathematics

Delft, The Netherlands

Delft University of Technology

Jan 2018 - Jan 2020

- Specialization: Optimization.
- Master thesis: 'New FPT algorithms for computing the temporal hybridization number of a set of phylogenetic trees'.
- Graduated with distinction (cum laude).
- Average grade: 8.8/10.

BSc Applied Mathematics

Delft, The Netherlands

Delft University of Technology

Sep 2014 - Jan 2018

- Bachelor thesis: 'Using the slice rank for finding upper bounds on the size of cap sets'.
- Graduated with distinction (cum laude).
- Average grade: 8.4/10.

BSc Computer Science

Delft, The Netherlands

Delft University of Technology

Sep 2014 - Jan 2018

- Average grade: 8.5/10.

Pre-university education ('Gymnasium')

Rotterdam, The Netherlands

GSR Rotterdam

Sep 2008 - Aug 2014

- Final research project: 'Better timetabling for high schools'.

Internships

Research internship

Pittsburgh, USA

Carnegie Mellon University

Apr 2023 - May 2023

- Worked with: Anupam Gupta.
- Research on online network design problems.

Research internship

Berlin, Germany

Zuse Institute Berlin

Sept 2021 - Nov 2021

- Worked with: Ambros Gleixner.
- Worked on new functionality for the academic MIP-solver SCIP and performed an experimental analysis of this functionality.

Internship

Zoetermeer, The Netherlands

ORTEC

Feb 2019 - Apr 2019

- Part of MSc program.
- As part of my internship I conducted a sensitivity analysis on new functionalities of ORTEC's software for solving vehicle routing problems.

Publications

A nearly optimal randomized algorithm for explorable heap selection

Sander Borst, Daniel Dadush, Sophie Huiberts, Danish Kashaev

- Appeared in IPCO 2023.

2022

arXiv:2210.05982

Integrality gaps for random integer programs via discrepancy

Sander Borst, Daniel Dadush, Dan Mikulincer

- Appeared in SODA 2023.

2022

arXiv:2203.11863

A multidimensional solution to additive homological equations

Aleksei Ber, Matthijs Borst, Sander Borst, Fedor Sukochev

- Appeared in *Izvestiya: Mathematics*

2021

arxiv:2170.11248

On the Integrality Gap of Binary Integer Programs with Gaussian Data

Sander Borst, Daniel Dadush, Sophie Huiberts, Samarth Tiwari

- Appeared in IPCO 2021.
- Full version appeared in *Mathematical Programming* (2022).

2021

arxiv:2012.08346

Majorizing measures for the optimizer

Sander Borst, Daniel Dadush, Neil Olver, Makrand Sinha

- Appeared in ITCS 2021.

2020

arxiv:2012.13306

New FPT algorithms for finding the temporal hybridization number for sets of phylogenetic trees

Sander Borst, Leo van Iersel, Mark Jones, Steven Kelk

- Appeared in *Algorithmica* (2022).

2020

arxiv:2007.13615

Attended workshops and conferences

- 2023 **Cargèse-Porquerolles Workshop on Combinatorial Optimization 2023** *Porquerolles, France*
Presented 'A nearly optimal randomized algorithm for explorable heap selection'
- 2023 **FRICO 2023** *TU Eindhoven*
Presented 'A nearly optimal randomized algorithm for explorable heap selection'
- 2023 **IPCO 2023** *UW Madison*
Presented 'A nearly optimal randomized algorithm for explorable heap selection'
- 2023 **'Aussois Combinatorial Optimization Workshop' 2023** *Aussois, France*
Presented 'Integrality gaps for random integer programs via discrepancy'
- 2023 **LNMB conference 'Mathematics of Operations Research'** *Soesterberg, Netherlands*
Presented 'Integrality gaps for random integer programs via discrepancy'
- 2023 **SODA 2023** *Florence, Italy*
Presented 'Integrality gaps for random integer programs via discrepancy'
- 2022 **Cargèse workshop on combinatorial optimization 2022** *IES Cargèse*
- 2022 **Workshop + Summer School 'Modern Trends in Combinatorial Optimization'** *EPFL Lausanne*
- 2022 **IPCO 2022** *TU Eindhoven*
Presented a poster 'Constraint propagation and conflict analysis for an exact MIP-solver'
- 2022 **STOC 2022** *Rome, Italy*
- 2022 **Workshop on 'Algorithms with Predictions'** *EPFL Lausanne*
- 2021 **IPCO 2021 (online)** *Georgia Tech*
Presented 'On the Integrality Gap of Binary Integer Programs with Gaussian Data'

Work Experience

Web developer

Ans Delft

- Working on the development of 'Ans', an application for digitally grading tests for universities and high schools.

Delft, The Netherlands

Nov 2018 - Jan 2019

Teaching Assistant

Delft University of Technology

- Introduction to programming (2015-2016)
- Algebra 1 (2015-2016, 2016-2017, 2017-2018)
- Real analysis (2016-2017)
- Optimization (2016-2017)
- Computational Intelligence (2017-2018)
- Complexity theory (2017-2018)
- Automata, languages and computability (2017-2018)

Delft, The Netherlands

Sept 2015- Aug 2018

Tutor Mathematics and Physics

Self-employed

Gouda, The Netherlands

Sept 2014-Jul 2016

Technical skills

Programming Python, Java, Sagemath, Rust, C#, C, C++, Javascript, Typescript, PHP, Ruby.

Miscellaneous Linux, \LaTeX , SQL, HTML, CSS, git.