

# Sebastian Wild

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## Employment

- since 2019**    **Lecturer** (Assistant Professor)  
Department of Computer Science · University of Liverpool
- 2017–2019**    **Postdoctoral Fellow and Sessional Instructor**  
David R. Cheriton School of Computer Science · University of Waterloo
- 2012–2017**    **Wissenschaftlicher Mitarbeiter** (research assistant)  
Department of Computer Science · University of Kaiserslautern  
parental leave for 6 months    (Dec. 2013 – Jan. 2014, May – June 2015, Nov. – Dec. 2016)

## Education

- Dr. rer. nat.**  
(equiv. to Ph.D.)    Department of Computer Science · University of Kaiserslautern · 2016  
Dissertation summa cum laude  
Title: *Dual-Pivot Quicksort and Beyond: Analysis of Multiway Partitioning and Its Practical Potential*  
Supervisor: Prof. Dr. Markus Nebel  
2nd Reviewer: Prof. Robert Sedgewick (Princeton University)  
3rd Reviewer: Univ.-Prof. Dr. Martin Dietzfelbinger (TU Ilmenau)
- M. Sc.**    Department of Computer Science · University of Kaiserslautern · 2012  
Final grade 1.1
- B. Sc.**    Department of Computer Science · University of Kaiserslautern · 2010  
Final grade 1.3
- Abitur**    Kurfürst-Ruprecht-Gymnasium · Neustadt a. d. Weinstraße · 2006  
Final grade 1.1

## Publications

NB: The convention in algorithms for author lists is alphabetical by last name.

Preprints and details at  
[www.wild-inter.net/publications](http://www.wild-inter.net/publications).  
 (Titles are clickable links).

### Peer-Reviewed Conference Papers

- [c14] *Succinct Euler-Tour Trees*  
 Travis Gagie and Sebastian Wild  
*Canadian Conference on Computational Geometry (CCCG) 2021*  
 M. He and D. Sheehy (eds.): CCCG 2021, pp 368–376
- [c13] *Hypersuccinct Trees – New universal tree source codes for optimal compressed tree data structures and range minima*  
 J. Ian Munro, Patrick K. Nicholson, Louisa Seelbach Benkner, and Sebastian Wild  
*European Symposium on Algorithms (ESA) 2021*  
 to appear
- [c12] *Lazy Search Trees*  
 Bryce Sandlund and Sebastian Wild  
*Foundations of Computer Science (FOCS) 2020*  
 S. Irani (ed.): FOCS 2020, IEEE, 2020, pp 704–715
- [c11] *Distance Oracles for Interval Graphs via Breadth-First Rank/Select in Succinct Trees*  
 Meng He, J. Ian Munro, Yakov Nekrich, Sebastian Wild, and Kaiyu Wu  
*International Symposium on Algorithms and Computation (ISAAC) 2020*  
 Y. Cao, SW. Cheng, M. Li (eds.): ISAAC 2020, LIPIcs 181, Dagstuhl, 2020, pp 25:1–25:18
- [c10] *Efficient Second-Order Shape-Constrained Function Fitting*  
 David Durfee, Yu Gao, Anup B. Rao, and Sebastian Wild  
*Algorithms and Data Structures Symposium (WADS) 2019*  
 Z. Friggstad, JR. Sack, M. Salavatipour (eds.): WADS 2019, LNCS 11646, Springer, 2019, pp 395–408
- [c9] *Sesquickselect: One and a half pivots for cache-efficient selection*  
 Conrado Martínez, Markus E. Nebel, and Sebastian Wild  
*Meeting on Analytic Algorithmics and Combinatorics (ANALCO) 2019*  
 M. Mishna and J.I. Munro (eds.): ANALCO 2019, SIAM, pp 54–66
- [c8] *Median-of-k Jumplists and Dangling-Min BSTs*  
 Markus E. Nebel, Elisabeth Neumann, and Sebastian Wild  
*Meeting on Analytic Algorithmics and Combinatorics (ANALCO) 2019*  
 M. Mishna and J.I. Munro (eds.): ANALCO 2019, SIAM, pp 74–86
- [c7] *Nearly-Optimal Mergesorts: Fast, Practical Sorting Methods That Optimally Adapt to Existing Runs*  
 J. Ian Munro and Sebastian Wild  
*European Symposium on Algorithms (ESA) 2018*  
 Y. Azar, H. Bast, G. Herman (eds.): ESA 2018, LIPIcs 112, Dagstuhl, 2018, pp 63:1–63:16

- [c6] *Average Cost of QuickXsort with Pivot Sampling*  
Sebastian Wild  
*International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms (AofA) 2018*  
MD. Ward, JA. Fill (eds.): AofA 2018, LIPIcs vol. 110, pp 36:1–36:19
- [c5] *Quicksort Is Optimal for Many Equal Keys*  
Sebastian Wild  
*Meeting on Analytic Algorithmics and Combinatorics (ANALCO) 2018*  
M. Nebel, S. Wagner (eds.): ANALCO 2018, SIAM, pp 8–22
- [c4] *Analysis of Branch Misses in Quicksort*  
Conrado Martínez, Markus E. Nebel, and Sebastian Wild  
*Meeting on Analytic Algorithmics and Combinatorics (ANALCO) 2015*  
R. Sedgewick, MD. Ward (eds.): ANALCO 2015, SIAM, pp 114–128
- [c3] *Pivot Sampling in Dual-Pivot Quicksort*  
Markus E. Nebel and Sebastian Wild  
*International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms (AofA) 2014*  
M. Bousquet-Mélou, M. Soria (eds.): DMTCS-HAL Proceedings Series, vol. BA, pp 325–338
- [c2] *Engineering Java 7's Dual Pivot Quicksort Using MALIJAN*  
Sebastian Wild, Markus E. Nebel, Raphael Reitzig, and Ulrich Laube  
*Meeting on Algorithm Engineering and Experiments (ALENEX) 2013*  
P. Sanders, N. Zeh (eds.): ALENEX 2013, SIAM, pp 55–69
- [c1] *Average Case Analysis of Java 7's Dual Pivot Quicksort*  
Sebastian Wild and Markus E. Nebel  
*European Symposium on Algorithms (ESA) 2012*  
L. Epstein and P. Ferragina (eds.): ESA 2012, LNCS 7501, Springer, pp 825–836.

### Peer-Reviewed Journal Articles

- [j7] *QuickXsort – A Fast Sorting Scheme in Theory and Practice*  
Stefan Edelkamp, Armin Weiß, and Sebastian Wild  
*Algorithmica* 82, 3, pp 509–588, 2020
- [j6] *Dual-pivot and beyond: The potential of multiway partitioning in quicksort*  
Sebastian Wild  
Distinguished Dissertations in *it – Information Technology*, 60, 3, pp 173–177, 2018
- [j5] *Building Fences Straight and High: An Optimal Algorithm for Finding the Maximum Length You Can Cut  $k$  Times from Given Sticks*  
Raphael Reitzig and Sebastian Wild  
*Algorithmica* 80, 11, pp 3365–3396, 2018
- [j4] *Analysis of Pivot Sampling in Dual-Pivot Quicksort*  
Markus E. Nebel, Sebastian Wild, and Conrado Martínez  
*Algorithmica* 75, 4, pp 632–683, 2016

- [J3] *Analysis of Quickselect under Yaroslavskiy's Dual-Pivoting Algorithm*  
Sebastian Wild, Markus E. Nebel, and Hosam Mahmoud  
*Algorithmica* 74, 1, pp 485–506, 2016
- [J2] *Average Case and Distributional Analysis of Dual Pivot Quicksort*  
Sebastian Wild, Markus E. Nebel, and Ralph Neininger  
*ACM Transactions on Algorithms* 11, 3, article 22, 2015
- [J1] *JAGUC – A Software Package for Environmental Diversity Analyses*  
Markus E. Nebel, Sebastian Wild, Michael Holzhauser, Lars Hüttenberger,  
Raphael Reitzig, Matthias Sperber, and Thorsten Stoeck  
*Journal of Bioinformatics and Computational Biology* 9, 6, pp 749–773, 2011

### Textbooks

- [B1] *Entwurf und Analyse von Algorithmen*  
(Design and Analysis of Algorithms)  
Markus Nebel and Sebastian Wild · *Springer Vieweg* · 2018

### Theses

- [T3] *Dual-Pivot Quicksort and Beyond: Analysis of Multiway Partitioning and Its Practical Potential*  
*Dissertation* · University of Kaiserslautern · 2016
- [T2] *Java 7's Dual Pivot Quicksort*  
*Master's Thesis* · University of Kaiserslautern · 2012
- [T1] *An Earley-style Parser for Solving the RNA-RNA Interaction Problem*  
*Bachelor's Thesis* · University of Kaiserslautern · 2010

### Manuscripts in Preparation & Working Papers

- [M5] *Succinct Permutation Graphs*  
Konstantinos Tsakalidis, Sebastian Wild, and Viktor Zamaraev
- [M4] *Dynamic Optimality Refuted – For Tournament Heaps*  
J. Ian Munro, Richard Peng, Sebastian Wild, and Lingyi Zhang
- [M3] *Entropy Trees and Range-Minimum Queries In Optimal Average-Case Space*  
J. Ian Munro, and Sebastian Wild
- [M2] *A Practical and Worst-Case Efficient Algorithm for Divisor Methods of Apportionment*  
Raphael Reitzig and Sebastian Wild
- [M1] *Reputation-Based Cooperation in Local Interaction: Evolution of Indirect Reciprocity with Minimal Memory* · Jano Costard, Sándor P. Fekete, Hella-Franziska Hoffmann, Alexander Koch, Dominik Leipold, Jonas Radbruch, Maximilian Schlund, Jann Spiess, Paul Stursberg, and Sebastian Wild

## Other Publications

- [O2] *Quicksort mit zwei Pivots und mehr* · Sebastian Wild  
GI LNI Dissertations Band 17 – Ausgezeichnete Informatikdissertationen 2016
- [O1] *Why is Dual-Pivot Quicksort Fast?* · Sebastian Wild  
extended abstract for *Theoretage 2015* (GI Workshop on Algorithms)

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## Awards and Honors

- 2017 **GI Dissertationspreis 2016** · [T3]  
Prize for **best dissertation** in computer science 2016 in Germany, Austria, and Switzerland, jointly awarded by *GI*, *SI*, and *OCG*
- 2017 Nominated for **Distinguished Teaching Award 2017** of *University of Kaiserslautern* for the design of the interactive course *Training für Programmierwettbewerbe*
- 2013 *Preis des Freundeskreises der TU Kaiserslautern* · [T2]  
**Best Master's Thesis** in the Department of Computer Science 2012
- 2012 **Best Paper Award** at the *European Symposium on Algorithms 2012* · [C1]
- 2009–2012 **Scholarship** of the German National Academic Foundation

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## Grants and Funding

- 2021–2022 **Travel Grant** for research visit to Kostas Tsichlas  
funded by The Royal Society, International Exchanges Program · volume £ 2 900
- 2020–2023 **PhD studentship** for Benjamin Smith  
funded by School of Electrical Engineering and Computer Science, University of Liverpool · 1 of 2 studentships in the department · volume £ 59 076
- 2021 **Workshop** *Algorithmic and probabilistic aspects of space efficiency*  
funded by London Mathematical Society, Department of Computer Science, and the NeST Initiative of University of Liverpool · volume £ 940
- 2020 **Travel Grant** for research visit to Markus Lohrey  
funded by the NeST Initiative of University of Liverpool · volume £ 940

## Talks

Slides available at [www.wild-inter.net/publications](http://www.wild-inter.net/publications).

### Invited Talks

- 2021 “Hypersuccinct Trees”  
*International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms (AofA) 2021* · 14 Jun. 2021
- 2021 “Quicksorts of the 21st Century”  
*Workshop Verified software: tools and experiments* · Special event celebrating quicksort’s 60th birthday · Isaac Newton Institute · 7 Jun. 2021
- 2019 “Dual-Pivot Quicksort and Beyond: An Analysis-of-Algorithms Perspective on Multiway Quicksort”  
*Computability in Europe 2019* · Special Session Smoothed and Probabilistic Analysis of Algorithms  
Durham University · 17 Jul. 2019
- 2018 “Succinct Data Structures For Range Minimum Problems”  
*NSF Center for Science of Information* · Purdue University · 24 Oct. 2018
- 2017 “Dual-Pivot Quicksort and Beyond”  
*Annual SPP Meeting* of the DFG Schwerpunktprogramm Algorithms for Big Data  
19 Oct. 2017
- 2016 “Dual-Pivot Quicksort and Beyond”  
Research Seminar · *Hasso-Plattner-Institut Potsdam* · 6 Sep. 2016

### Conference & Workshop Presentations

- 2019 “Second-Order Shape-Constrained Function Fitting” · [c10]  
*WADS 2019* · 6 Aug. 2019
- 2019 “Compressed Range-Minimum Queries: Average-Case Analysis of Search Trees Meets Space-Efficient Data Structures” · [m3]  
*AofA Meeting* · 24 Jun. 2019
- 2019 “Entropy Trees & Range-Minimum Queries In Optimal Average-Case Space” · [m3]  
*Dagstuhl Seminar 19 051* (Data Structures for the Cloud and External Memory Data)  
28 Jan. 2019
- 2019 “Sesquiselect: One and a half pivots for cache-efficient selection” · [c9]  
*ANALCO Conference* · 06 Jan. 2019
- 2018 “Nearly-optimal Mergesorts” · [c7]  
*ESA Conference* · 20 Aug. 2018
- 2018 “Average Cost of QuickXsort with Pivot Sampling” · [c6]  
*AofA Conference* · 28 June 2018
- 2018 “Quicksort Is Optimal for Many Equal Keys” · [c5]  
*ANALCO Conference* · 8 Jan. 2018
- 2017 “Median-of-k Quicksort is optimal for many equal keys”  
*AofA Meeting* · 19 June 2017

- 2016 “Quicksort with Equal Keys”  
**Dagstuhl Seminar 16 101** (Data Structures and Advanced Models of Computation on Big Data)  
7 March 2016
- 2015 “Why is Dual-Pivot Quicksort Fast?” · [O1]  
**GI Theorietage** (Workshop) · 29 Sept. 2015
- 2015 “Analysis of Branch Misses in Quicksort” · [C4]  
**ANALCO Conference** · 4 Jan. 2015
- 2014 “Pivot Sampling in Dual-Pivot Quicksort” · [C3]  
**AofA Conference** · 16 June 2014
- 2014 “Dual-Pivot Quicksort – Asymmetries in Sorting”  
**Dagstuhl Seminar 14 091** (Data Structures and Advanced Models of Computation on Big Data)  
25 March 2014
- 2013 “Engineering Java 7’s Dual Pivot Quicksort Using MALIJAN” · [C2]  
**ALENEX Conference** · 7 Jan. 2013
- 2013 “Quickselect Under Yaroslavskiy’s Dual-Pivoting Algorithm”  
**AofA Meeting** · 28 May 2013
- 2013 “Java 7’s Dual Pivot Quicksort”  
**FORMAT Workshop** · 9 April 2013
- 2012 “Average Case Analysis of Java 7’s Dual Pivot Quicksort” · [C1]  
**ESA Conference** · 11 Sept. 2012

### Departmental Talks

- 2019 “Dual-Pivot Quicksort and Beyond” · University of Liverpool · 10 Dec. 2019
- 2017 “Dual-Pivot Quicksort and Beyond” · University of Waterloo · 1 Nov. 2017
- 2015 “Dual-Pivot Quicksort” · University of Kaiserslautern · 24 Mar. 2015

## Teaching Experience

*Details on courses and teaching evaluations at [www.wild-inter.net/teaching](http://www.wild-inter.net/teaching).  
(Titles are clickable links).*

### Instructor of Record

Sole responsibility for module (give lectures, design assignments, take/design exams).

- 2021 *Applied Algorithmics (COMP 526)* · postgraduate level
- 2020 *Applied Algorithmics (COMP 526)*
- 2018 *Data Structures and Data Management (CS 240)* · undergraduate level
- 2017 *Advanced Algorithmics: Strategies for Hard Problems* · advanced postgraduate level
- 2017 *Competitive Programming* · undergraduate level
- 2016/17 *Algorithms and Data Structures* · undergraduate level, non-CS majors



## Teaching Assistance

Responsible for tutorials (recruit student tutors, design assignments and exams, give exercise classes).

- 2015/16**    *Introduction to the Mathematical Analysis of Algorithms*
- 2014**    (original title: *Algorithm Engineering*) · advanced postgraduate level
  
- 2013/14**    *Computational Biology I: Alignments and Sequencing*
- advanced undergraduate level
  
- 2015/16**    *Computational Biology II: Signals, Phylogenetics and Structure Prediction*
- 2014**    postgraduate level
- 2012/13**
  
- 2014/15**    *Design and Analysis of Algorithms* · intermediate undergraduate level
  
- 2013**    *Combinatorial Algorithms: String Search, Compression, Networks,*
- and Random Generation* · advanced undergraduate level
  
- 2013/14**    *Proof Techniques* · tutorial at introductory undergraduate level
- 2012/13**

## Student Tutor

(grade assignments, give exercise class).

*Formal Foundations of Programming* · *Software Development I: Introduction to Programming* ·  
*Software Development III: Concurrency and Parallel Programming*

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# Supervised Students

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## PhD Students

- 2020–2024**    Benjamin Smith
- 2021–2025**    Eva Onokpasa

## Selected Master's Theses

- 2020**    Benjamin Smith · Title: *Exact Solutions for the Bamboo Garden Trimming Problem*

## Selected Bachelor's Theses

- 2016**    Marvin Peterson · Title: *Experimental View on Cache Behavior of Search Trees*
- 2015**    Elisabeth Neumann · Title: *Randomized Jumplists With Several Jump Pointers* · [c8]



## Service

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### To Profession

- Program committees** AofA 2022 · ESA 2019 · ANALCO 2019 · ANALCO 2018
- Reviews (journals)** *ACM Journal of Experimental Algorithmics* · *ACM Transactions on Algorithms* · *Algorithmica* · *Bulletin of Mathematical Biology* · *Combinatorics, Probability & Computing* · *IEEE Transactions on Computers* · *Information Processing Letters* · *International Journal of Computer Mathematics* · *Mathematics in Computer Science* · *Software: Practice and Experience* · *The Computer Journal* · *Theoretical Computer Science* · *Stochastics (Intern. J. of Probability and Stochastic Processes)*
- Reviews (conferences)** SODA 2022 · ISAAC 2021 · STACS 2021 · SoCG 2020 · SODA 2020 · SOFSEM 2020 · SPAA 2019 · SEA 2018 · WADS 2017 · SEA 2017 · ANALCO 2017 · AofA 2016 · SWAT 2014 · ANALCO 2014 · ESA 2013

### To Department

- since 2020** Coordinator of **Outreach Activities** of the department
- 2012 – 2017** Representative of Scientific Employees in **Examination Board**

## Additional Training

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- 2020** *Postgraduate Certificate Academic Practice*  
Level 7 qualification in Learning and Teaching in Higher Education  
The Academy, University of Liverpool
- 2017** *Teaching Development Seminar Series for Postdocs*  
Centre for Teaching Excellence, University of Waterloo · 6 – 10 Nov. 2017
- 2016** *Lehre 2.0 – Lehren mit dem Internet*  
Workshop on including social media in teaching · 13 June 2016
- 2015** *Meetings und Projektbesprechungen effizient und zielgerichtet leiten*  
Workshop on how to effectively chair a group meeting · 9 – 10 April 2015

## Nonacademic Work Experience

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- Java Developer** *marketmaker Software AG* (since 2012 part of *vwd Vereinigte Wirtschaftsdienste GmbH*)  
Jul 2010 – Apr 2012 in term breaks  
Developed server components for a web-based financial market-data solution.

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## Languages

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**German**    native

**English**    fluent

**French**    elementary

**Spanish**    elementary