

Da Wei (David) Zheng

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PhD candidate researching algorithms and data structures involving geometry and graphs.

Education

- **University of Illinois Urbana-Champaign** Champaign, IL
PhD Computer Science (Theory) Aug 2020 - (expected) May 2025
Advisor: Timothy M. Chan
Thesis: From Geometry to Graphs: Geometric data structures and Graph Tools
- **University of British Columbia** Vancouver, BC
MSc Computer Science (Theory) Sep 2018 - Aug 2020
Advisor: William Evans
Thesis: [Scheduling queries to moving entities to certify many are distant from a region](#)
- **University of British Columbia** Vancouver, BC
BSc Combined Honours Mathematics and Computer Science Sep 2014 - May 2018

Conference publications

Note that it is standard for papers in theoretical computer science to list authors in alphabetical order.

16. (*Manuscript*) **Da Wei Zheng**. A Simple Approximation Scheme for Bipartite Geometric Many-to-Many Matching.
15. (*To appear in SODA 2025*) Adam Karczmarz and **Da Wei Zheng**. [Subquadratic algorithms in minor-free digraphs: \(weighted\) distance oracles, decremental reachability, and more.](#)
14. (**ESA 2024**) Elfarouk Harb, Zhengcheng Huang, and **Da Wei Zheng**. [Shortest Path Separators in Unit Disk Graphs](#). *32nd Annual European Symposium on Algorithms (ESA 2024)*. Vol. 308. 66:1–66:14.
13. (**ESA 2024**) Chandra Chekuri, Rhea Jain, Shubhang Kulkarni, **Da Wei Zheng**, and Weihao Zhu. [From Directed Steiner Tree to Directed Polymatroid Steiner Tree in Planar Graphs](#). *32nd Annual European Symposium on Algorithms (ESA 2024)*. Vol. 308. 42:1–42:19.
12. (**CCCG 2024**) Eliot W. Robson, Jack Spalding-Jamieson, and **Da Wei Zheng**. [Carving Polytopes with Saws in 3D](#). *Proceedings of the 36th Canadian Conference on Computational Geometry, CCCG 2024, Brock University, St. Catharines, Ontario, Canada, July 17 - July 19, 2024*. Pp. 145–151.
11. (**SoCG 2024**) Timothy M. Chan, Pingan Cheng, and **Da Wei Zheng**. [Semialgebraic Range Stabbing, Ray Shooting, and Intersection Counting in the Plane](#). *40th International Symposium on Computational Geometry, SoCG 2024, June 11-14, 2024, Athens, Greece*. Vol. 293. 33:1–33:15.
10. (**SODA 2024**) Timothy M. Chan, Pingan Cheng, and **Da Wei Zheng**. [An Optimal Algorithm for Higher-Order Voronoi Diagrams in the Plane: The Usefulness of Nondeterminism](#). *Proceedings of the 2024 ACM-SIAM Symposium on Discrete Algorithms, SODA 2024, Alexandria, VA, USA, January 7-10, 2024*. Pp. 4451–4463.
9. (**SODA 2024**) Yi-Jun Chang and **Da Wei Zheng**. [Fully Scalable Massively Parallel Algorithms for Embedded Planar Graphs](#). *Proceedings of the 2024 ACM-SIAM Symposium on Discrete Algorithms, SODA 2024, Alexandria, VA, USA, January 7-10, 2024*. Pp. 4410–4450.

8. (ICALP 2023) Monika Henzinger, Paul Liu, Jan Vondrák, and **Da Wei Zheng**. [Faster Submodular Maximization for Several Classes of Matroids](#). *50th International Colloquium on Automata, Languages, and Programming, ICALP 2023, July 10-14, 2023, Paderborn, Germany*. Vol. 261. 74:1–74:18.
7. (IPCO 2023) **Da Wei Zheng** and Monika Henzinger. [Multiplicative Auction Algorithm for Approximate Maximum Weight Bipartite Matching](#). *Integer Programming and Combinatorial Optimization - 24th International Conference, IPCO 2023, Madison, WI, USA, June 21-23, 2023, Proceedings*. Vol. 13904. Pp. 453–465.
6. (SODA 2023) Timothy M. Chan and **Da Wei Zheng**. [Simplex Range Searching Revisited: How to Shave Logs in Multi-Level Data Structures](#). *Proceedings of the 2023 ACM-SIAM Symposium on Discrete Algorithms, SODA 2023, Florence, Italy, January 22-25, 2023*. Pp. 1493–1511.
5. (SODA 2023) Sarel Har-Peled and **Da Wei Zheng**. [Halving by a Thousand Cuts or Punctures](#). *Proceedings of the 2023 ACM-SIAM Symposium on Discrete Algorithms, SODA 2023, Florence, Italy, January 22-25, 2023*. Pp. 1385–1397.
4. (SoCG 2022) Jack Spalding-Jamieson, Brandon Zhang, and **Da Wei Zheng**. [Conflict-Based Local Search for Minimum Partition into Plane Subgraphs](#). *38th International Symposium on Computational Geometry (SoCG 2022)*. Vol. 224. 72:1–72:6.
3. (SODA 2022) Timothy M. Chan and **Da Wei Zheng**. [Hopcroft’s Problem, Log-Star Shaving, 2D Fractional Cascading, and Decision Trees](#). *Proceedings of the 2022 ACM-SIAM Symposium on Discrete Algorithms, SODA 2022, Virtual Conference / Alexandria, VA, USA, January 9 - 12, 2022*. Pp. 190–210.
2. (SoCG 2021) Paul Liu, Jack Spalding-Jamieson, Brandon Zhang, and **Da Wei Zheng**. [Coordinated Motion Planning Through Randomized k-Opt \(CG Challenge\)](#). *37th International Symposium on Computational Geometry, SoCG 2021, June 7-11, 2021, Buffalo, NY, USA (Virtual Conference)*. Vol. 189. 64:1–64:8.
1. (SoCG 2020) **Da Wei Zheng**, Jack Spalding-Jamieson, and Brandon Zhang. [Computing Low-Cost Convex Partitions for Planar Point Sets with Randomized Local Search and Constraint Programming \(CG Challenge\)](#). *36th International Symposium on Computational Geometry, SoCG 2020, June 23-26, 2020, Zürich, Switzerland*. Vol. 164. 83:1–83:7.

Journal Publications

In theoretical computer science, journal publications are usually seen as less important than conference publications.

4. Timothy M. Chan and **Da Wei Zheng**. [Hopcroft’s Problem, Log* Shaving, Two-dimensional Fractional Cascading, and Decision Trees](#). *ACM Trans. Algorithms*. 20, 3. P. 24
3. **Da Wei Zheng** and Monika Henzinger. [Multiplicative Auction Algorithm for Approximate Maximum Weight Bipartite Matching](#). *Math. Prog. Series B*. 20, 3. P. 24
2. Loïc Crombez, Guilherme Dias da Fonseca, Florian Fontan, Yan Gerard, Aldo Gonzalez-Lorenzo, Pascal Lafourcade, Luc Libralesso, Benjamin Momège, Jack Spalding-Jamieson, Brandon Zhang, and **Da Wei Zheng**. [Conflict Optimization for Binary CSP Applied to Minimum Partition into Plane Subgraphs and Graph Coloring](#). *ACM J. Exp. Algorithmics*. 28. 1.2:1–1.2:13
1. Paul Liu, Jack Spalding-Jamieson, Brandon Zhang, and **Da Wei Zheng**. [Coordinated Motion Planning Through Randomized k-Opt](#). *ACM J. Exp. Algorithmics*. 27. 3.4:1–3.4:9

Service

I was a subreviewer for

ITCS 2025, STACS 2025, SODA 2025, SOSA 2025, ALENEX 2025, ESA 2024, ICALP 2024, STACS 2024, SoCG 2024, APPROX 2023, ESA 2023, ICALP 2023, SODA 2023, ESA 2022, and SoCG 2022.

I reviewed for the journals CGTA, JEA, and Operations Research Letters.

Talks

- **Fully Scalable Massively Parallel Algorithms for Embedded Planar Graphs**
 - *Presented paper at SODA 2024*
 - Dartmouth Theory Seminar May 2024
 - Carnegie Mellon University Student Theory Seminar May 2024
 - University of Warsaw Theory Seminar Mar 2024
 - University of Vienna Theory Seminar Mar 2024
 - University of Illinois Urbana-Champaign Theory Seminar Jan 2024
- **Multiplicative Auction Algorithm**
 - *Presented paper at IPCO 2023*
 - University of Toronto Student Theory Seminar (remote) Sep 2023
 - University of British Columbia Algorithms Lab / MILD Joint Seminar May 2023
 - University of Illinois Urbana-Champaign Theory Seminar May 2023
- **Halving by a Thousand Cuts or Punctures**
 - *Presented paper at SODA 2023*
 - New York Geometry Seminar (remote) May 2023

Internships

- **Nuro** Mountain View, CA
 - *PhD Intern, “Occlusion-aware autonomous driving”* May 2022 - Aug 2022
- **Google LLC** Mountain View, CA
 - *Software Engineering Intern, “Querying payments change history”* May 2018 - Aug 2018
- **Facebook Inc.** Menlo Park, CA
 - *Software Engineering Intern, “Integrating VMs in container service”* Jun 2017 - Sep 2017
- **Dr. Daniel Coomb’s Applied Mathematics Lab** University of British Columbia
 - *USRA Intern, “Graph based clustering for biological data analysis”* May 2016 - Aug 2016

Awards

- NSERC PGS-D Scholarship 2022 - 2025
- NSERC Undergrad Summer Research Award 2016
- Stanley M Grant Scholarship in Mathematics 2015
- **Computational Geometry: Solving Hard Optimization Problems (CG:SHOP)**
 - *Geometric optimization challenges held as part of Computational Geometry Week (CG Week)*
 - Minimum Partition into Plane Subgraphs (**2nd** place) 2022
 - Coordinated Motion Planning (**3st** place) 2021
 - Minimum Convex Partition (**1st** place) 2020

Teaching

- **Department of Computer Science** University of Illinois Urbana-Champaign
Teaching Assistant
 - CS 374 - Algorithms and Models of Computation *Fall 2021, Spring 2022*
- **Department of Computer Science and Mathematics** University of British Columbia
Instructor
 - CPSC 490 - Problem Solving in Computer Science *Spring 2017**Teaching Assistant*
 - CPSC 420 - Advanced Algorithms and Data Structures *Fall 2018, Spring 2019*
 - CPSC 221 - Algorithms and Data Structures *Summer 2016, Fall 2016, Spring 2017*
 - MATH 180 - Differential Calculus with Physical Applications *Fall 2015*

Other

- **Competitive Programming** University of Illinois Urbana-Champaign
Coach
 - *Coach* - Ran local practices, problem discussion, and coached teams. *2022 - now*
 - Coached teams to Mid Central USA regional 1st (2022), 1st (2023), 2nd (2024), North American Championship 2nd (2023), ICPC World Finals 63rd (2022), 51st (2023).
- **Competitive Programming Club** University of British Columbia
Coach and Participant
 - *Coach* - Ran local practices, problem discussion, and coached teams. *2017 - 2020*
 - Coached teams to PacNW 1st (2019), 2nd (2020), ICPC World Finals 25th (2020), Honorable mention (2021).
 - Created questions and hosted the UBC Programming Contest 2019 and 2020.
 - *Participant* - Worked as a team of three in competitions. *2015 - 2019*
 - 1st place in PacNW 2018 and 41st place in ICPC World Finals 2019 in Porto.
 - 3rd place in PacNW 2017 and 56th place in ACM-ICPC World Finals 2018 in Beijing.
- **UBC Math Circle** University of British Columbia
Organizer - weekly lectures and problems for high school students. *2017 - 2018*
- **Capture the Flag (CTF) Competitions** Maple Bacon (UBC) & SIGPwny (UIUC)
Participant *2021 - 2022*