

Adrian She

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Education

University of Toronto **Toronto, ON**
PhD in Mathematics *September 2020 - (Expected) December 2024*

University of Toronto **Toronto, ON**
Master of Science in Computer Science *September 2018 - August 2020*
Specialized in Theoretical Computer Science

University of British Columbia (UBC) **Vancouver, BC**
Bachelor of Science *September 2013 - April 2018*
Combined Honours in Mathematics and Computer Science, Minor in Physics

Academic Awards

- National Sciences and Engineering Council of Canada: NSERC Canada Graduate Scholarship - Doctoral (2020-Present)
- University of Toronto Faculty of Arts and Science Masters' Recruitment Award (2019)
- UBC Computer Science Outstanding Undergraduate Teaching Assistant Award (2018)
- Stanley M. Grant Scholarship for Mathematics Students (2016, 2017)
- Reginald Palliser-Wilson Scholarship for Mathematics Students (2015)
- TREK Excellence Scholarship for Academic Achievement (2014, 2015)

Research Interests and Expertise

- Quantum algorithms and complexity theory
- Algebraic complexity theory
- Proof complexity
- Discrete mathematics

Research Experience

University of Toronto **Toronto, ON**
Graduate Research Student *September 2018 - Present*

- Read papers in quantum algorithms and complexity theory, proof complexity theory, and algebraic complexity theory.
- Working in problems in these areas by formulating and proving conjectures, writing up results in technical reports and conference papers, and presenting results in research group meetings and conferences.

UBC Math Department **Vancouver, BC**
Undergraduate Research Student *May 2016 - August 2018*

- Investigated problems in combinatorics during Undergraduate Summer Research Assistant (USRA) program, by using software such as MATLAB and Python, and by formulating and proving conjectures.

Publications

arXiv publications available at https://arxiv.org/a/she_a_2.html.

1. N. Galesi, J. Grochow, T. Pitassi, and **A. She**, 2023. On the algebraic proof complexity of Tensor Isomorphism.
arXiv preprint 2305.19320.
In Proceedings of Computational Complexity Conference (CCC) 2023.
2. **A. She**, and H. Yuen, 2023. Unitary Property Testing Lower Bounds by Polynomials.
arXiv preprint 2210.05885.
In Proceedings of Innovations in Theoretical Computer Science (ITCS) 2023.
Presented at Quantum Information Processing (QIP) 2023.
3. P. Chaugule, M. Kumar, N. Limaye, C.. M. Mohapatra, **A. She**, S. Srinivasan, 2023. Schur polynomials do not have small formulas if the determinant does not.
arXiv preprint 1911.12520
In Proceedings of Computational Complexity Conference (CCC) 2020.
Published in *computational complexity, Volume 32*
4. P. Chatterjee, M. Kumar, **A. She**, B. L. Volk, 2022. A quadratic lower bound for algebraic branching programs.
arXiv preprint 1911.11793.
In Proceedings of Computational Complexity Conference (CCC) 2020.
Published in *computational complexity, Volume 31*.
5. S. Dahlberg, **A. She**, and S. van Willigenburg, 2021. Chromatic Posets.
arXiv preprint 1909.12394
Published in *Journal of Combinatorial Theory, Series A, Volume 184*
6. S. Dahlberg, **A. She**, and S. van Willigenburg, 2019. Schur and e -positivity of trees and cut vertices.
arXiv preprint 1901.02468
Published in *Electronic Journal of Combinatorics, Volume 27, Issue 1*.

Presentations

- **“On the algebraic proof complexity of Tensor Isomorphism”**:
 - Computational Complexity Conference (CCC 2023), July 2023.
- **“Unitary Property Testing Lower Bounds by Polynomials”**:
 - Innovations in Theoretical Computer Science (ITCS 2023), January 2023.
 - University of Victoria Theory Seminar, March 2023.
 - University of Texas Austin Quantum Seminar, April 2023.
 - Quantum BC Research Day, April 2023 (Poster Presentation).
 - Joint Centre for Quantum Information and Computer Science (QuiCS) Seminar, May 2023.
 - SIAM Conference on Applied Algebraic Geometry, “Algebraic and Geometric Structures in Quantum Information” Mini-Symposium, July 2023.

- **“Schur polynomials do not have small formulas if the determinant does not”**
 - Computational Complexity Conference 2020, July 2020.
 - ToniCS Conference, Simons Institute, University of California Berkeley, March 2023.
- **“Improved Analysis of the Product Test”**
 - Quantum Information Processing Conference 2020, January 2020 (Poster Presentation).
- **University of Toronto Theory Student Seminar**, one presentation each semester from Winter 2019 to Winter 2022.

Teaching Experience

University of Toronto Mathematics Department **Toronto, ON**
Lead Writing TA *June 2021 - May 2022*

- Responsible for supervising and training TAs in first and second year level courses.
- Designed course assignments and tutorials for first and second year level courses.

University of Toronto Mathematics Department **Toronto, ON**
Teaching Assistant *January 2019 - May 2022*

Responsible for leading student tutorials and marking assignments in courses:

- MAT 301: Groups and Symmetries (Summer 2021, Fall 2021, Winter 2022)
- MAT 294: Calculus and Differential Equations (Fall 2021)
- MAT 237: Multivariable Calculus (Summer 2021)
- MAT 224: Linear Algebra II (Winter 2021)
- MAT 187: Calculus II (Winter 2020, Winter 2021)
- MAT 186: Calculus I (Fall 2020)
- MAT 188: Linear Algebra (Fall 2020)
- MAT 344: Introduction to Combinatorics (Winter 2019)

University of Toronto Computer Science Department **Toronto, ON**
Sessional Instructor *January 2020 - April 2020*

- CSC 463: Computability and Complexity Theory (Winter 2020):
 - Designed course lectures, tutorials, problem sets, midterm and final assessments.
 - Supervised two teaching assistants.
 - Assisted students through email, at in-person office hours, and online discussion forum.
 - Adapted course to online delivery in response to COVID-19 pandemic.

University of Toronto Computer Science Department **Toronto, ON**
Teaching Assistant *September 2018 - August 2020*

Responsible for creating online materials for:

- CSC 373: Algorithm Design, Analysis, and Complexity (Summer 2020)

Responsible for leading student tutorials and marking assignments in courses:

- CSC 236: Introduction to Theoretical Computer Science (Fall 2018, Fall 2019)
- CSC 463: Computability and Complexity Theory (Winter 2019)

UBC Computer Science Department **Vancouver, BC**
Teaching Assistant *May 2014 - April 2018*

Responsible for leading student tutorials and marking assignments in courses:

- CPSC 320: Intermediate Algorithm Design and Analysis (Fall 2016, Winter 2017, Fall 2017, Winter 2018)
- CPSC 121: Models of Computation (Fall 2015, Winter 2016)
- CPSC 110: Computation, Programs, and Programming (Summer 2014, Fall 2014)

Service

- Subreviewer for papers submitted to QIP 2020, CCC 2021, ITCS 2023, ICALP 2023 conferences.
- Organizer and webmaster for Theory Student Seminar during Winter 2022.
- Mathematics Mentor (Winter 2020, 2021, 2022):
 - Volunteered time to mentor and teach talented high school students interested in pursuing post-secondary education or a career related to mathematics.
- Presented introductory talk on quantum complexity theory to University of Toronto Quantum Computing Club (Winter 2020).