

Sylvester W. Zhang

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Personal Info

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Address: Vincent Hall 426, 206 Church Street SE, Minneapolis, MN 55455

Education

University of Minnesota, Twin Cities

Minneapolis, MN

Ph.D. in Mathematics

Sep 2020 - in progress

M.S. in Mathematics

Sep 2020 - Jan 2024

B.S. in Mathematics

Sep 2016 – May 2020

B.A. in Quantitative Economics

Sep 2016 – May 2020

Awards and scholarships

UROP Scholarship for undergrad research (UMN)

2020

Ordway Fellowship (School of Mathematics, UMN)

2024

Doctoral Dissertation Fellowship (UMN)

2024

Research

I work on algebraic combinatorics, particularly in the areas of cluster algebras, Schubert calculus, and representation theory.

Publications

1. An Expansion Formula for Decorated Super-Teichmüller Spaces.

with G. Musiker & N. Ovenhouse.

SIGMA 17 (2021) 080. [arXiv 2102.09143](#)

2. Arborescence of Covering Graphs.

with S. Chepuri, C. Dowd, A. Hardt, G. Michel, & V. Zhang.

Algebr. Comb. Vol. 5 (2022) [arXiv 1912.01060](#)

3. Double Dimer Covers on Snake Graphs from Super Cluster Expansions.

with G. Musiker & N. Ovenhouse.

J. Algebra Vol 608 (2022) pp. 325-381. [arXiv 2107.14785](#)

4. Rowmotion Orbits of Trapezoid Posets.

with J. Wellman, Q. Dao, & C. Yost-Wolff.

Electron. J. Comb. 29-2 (2022) [arXiv 2002.04810](#)

5. Rooted Clusters for Graph LP Algebras.

with E. Banaian, S. Chepuri, & E. Kelley.

SIGMA 18 (2022), 089. [arXiv 2107.14785](#).

6. Matrix Formulae for Decorated Super Teichmüller Spaces.

with G. Musiker & N. Ovenhouse.

J. Geom. Phys. (2023) [arXiv 2208.13664](#).

7. A Lattice Model for Super LLT Polynomials.

with M. Curran, C. Frechette, C. Yost-Wolff, & V. Zhang

Comb. Theory (2023) [arXiv 2110.07597](#).

Preprints

- 8. Higher Dimer Covers on Snake Graphs.**
with G. Musiker, N. Ovenhouse, & R. Schiffler.
[arXiv 2306.14389](#)
- 9. Snake Graphs for Graph LP Algebras.**
with E. Banaian, S. Chepuri, & E. Kelley.
[arXiv:2312.12313](#).
- 10. Higher q -Continued Fractions**
with A. Burcroff, N. Ovenhouse, & R. Schiffler.
[arXiv:2408.06902](#).
- 11. Schubert Calculus and the Heisenberg Algebra**
[arXiv:2409.20389](#).

Proceedings

- 12. Rooted Clusters for Graph LP Algebras**
with E. Banaian, S. Chepuri & E. Kelley
[proceeding of FPSAC 2022](#)
- 13. Double Dimers and Super Ptolemy Relations**
with G. Musiker & N. Ovenhouse
[proceeding of FPSAC 2023](#)

Invited Talks

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|---|----------------|
| Schubert Calculus and Boson-Fermion Correspondence | |
| Combinatorics Seminar, UMN. | February 2024 |
| Algebra Geometry and Combinatorics Seminar, UIUC. | February 2024 |
| Combinatorics Seminar, UCSD. | Mar 2024 |
| The Greene-Kleitman Correspondence | November 2022 |
| Student Algebra and Representation Seminar, SUNY Rutgers. | |
| Super Cluster Algebras from Surfaces. | |
| Combinatorics Seminar, University of Minnesota. | September 2022 |
| AMS sectional meetings, Cincinnati. | April 2023 |
| Combinatorial Formulas for Graph LP algebras. | April 2022 |
| Student Combinatorics and Algebras Seminar, University of Minnesota | |
| Cluster Structures from Decorated Super-Teichmüller Spaces. | April 2022 |
| Workshop on supergeometry and bracket structures, Fields institute. | |
| Schur and LLT Polynomials from Lattice Models. | March 2021 |
| Graduate Online Combinatorics Colloquium (GOCC) | |
| T-paths Formula for Decorated Super-Teichmüller Spaces. | Feb 2021 |
| Combinatorics Seminar, University of Minnesota | |

Teaching

- Teaching assistant, University of Minnesota**
Math 2263 (multivariable calculus): Spring 2021 Fall 2022
Math 1372 (calculus 2): Fall 2021

Math 1271 (calculus 1): Fall 2020 Spring 2021
Math 1051 (pre-calculus): Fall 2019 Spring 2020

Lecturer, University of Minnesota

Math 4242 (applied linear algebra): Summer 2024

Mentoring

PKU Algebraic Combinatorics Experience.

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|---|-------------|
| • Unimodality of higher q -continued fractions (Mentor) | Summer 2023 |
| • Two conjectures on covering graphs (Mentor) | Summer 2023 |
| • Combinatorics of SL_3 cluster variables. (Mentor) | Summer 2023 |
| • Promotion orbit on trapezoid posets. (Mentor) | Summer 2023 |

Algebra and Combinatorics REU at the University of Minnesota

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| • Classification for Divides of Finite Mutation Type. (TA) | Summer 2022 |
| • Minimal Matching for dP_3 cluster algebras. (TA) | Summer 2022 |
| • Kazhdan-Lusztig immanants and $\%$ -immanants. (TA) | Summer 2021 |

Organization

Minnesota Research Workshop in Algebra & Combinatorics

Co-organizer. Summer 2022 and 2023

Student Combinatorics and Algebra Seminar at UMN

Co-organizer. Fall 2023 – Spring 2024

Peking Algebraic Combinatorics Experience (REU).

Co-organizer and problem mentor. Summer 2023 and 2024