

# Sylvester W. Zhang

Updated November 4, 2024

**Personal Info**      **Email:** [swzhang@umn.edu](mailto:swzhang@umn.edu)      **Homepage:** <http://www.sylvesterzhang.com>  
**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

- 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.**

- 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**

- 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