Sylvester W. Zhang

Personal Info

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Employment

University of California, Los Angeles — Los Angeles, CA
Hendrick Assistant Adjunct Professor — July 2025 — June 2028

Education

University of Minnesota, Twin Cities — Minneapolis, MN
Ph.D. in Mathematics — Sep 2020 — July 2025
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

Research

My research is in the area of algebraic combinatorics, often among the intersection of total positivity, geometry of the flag variety, and representation theory of linear groups. In particular, I am interested in (i) Schubert calculus and symmetric functions (ii) combinatorial representation theory and (iii) cluster algebras.

Publications

1. **An Expansion Formula for Decorated Super-Teichmüler 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 Teichmüler 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

Instructor, UCLA

Math 206a (Topics in Combinatorics): Fall 2025

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

Instructor, 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