

# SONG YU

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🏡 <https://song-yu-math.github.io>

## EMPLOYMENT

Caltech-Tsinghua Joint Postdoctoral Fellow

California Institute of Technology, Pasadena, CA, USA  
Tsinghua University, Beijing, China

August 2023 – July 2024  
October 2024 – Present

## EDUCATION

Ph.D. in Mathematics, Columbia University, New York, NY, USA	September 2017 – May 2023
Advisor: Chiu-Chu Melissa Liu	
Thesis: <i>Open/closed correspondence and mirror symmetry</i>	
B.A. in Mathematics, Pomona College, Claremont, CA, USA	August 2013 – May 2017
Academic Advisor: Shahriar Shahriari	
Thesis Advisor: Erica Flapan	
Thesis: <i>Symmetries of spatial graphs in homology spheres</i>	
Certificate (with distinction), Math in Moscow, Moscow, Russia	September – December 2015
Certificate, Budapest Semesters in Mathematics, Budapest, Hungary	June – August 2015

## HONORS AND AWARDS

1. Dean's Fellowship, Columbia University	September 2017 – May 2023
2. Hugh J. Hamilton Prize in Mathematics, Pomona College	May 2017
3. Summer Undergraduate Research Program funding, Pomona College	June – August 2016
4. Bruce Jay Levy Prize in Mathematics, Pomona College	May 2016
5. AMS scholarship for Math in Moscow Program	September – December 2015
6. Llewellyn Bixby Mathematics Prize, Pomona College	May 2015
7. Summer Undergraduate Research Program funding, Pomona College	May – July 2014
8. Jaeger Mathematics Prize, Pomona College	May 2014

## RESEARCH PAPERS

### Preprint

1. *Quantum cohomology of variations of GIT quotients and flips*, with Zhaoxing Gu, Tony Yue Yu, [arXiv:2508.15770](https://arxiv.org/abs/2508.15770).
2. *Hodge-theoretic open/closed correspondence*, [arXiv:2507.09941](https://arxiv.org/abs/2507.09941).

3. *Remodeling Conjecture with descendants*, with Bohan Fang, Chiu-Chu Melissa Liu, and Zhengyu Zong, [arXiv:2504.15696](https://arxiv.org/abs/2504.15696).
4. *Orbifold open/closed correspondence and mirror symmetry*, with Chiu-Chu Melissa Liu, [arXiv:2210.11721](https://arxiv.org/abs/2210.11721).

## Published

1. *The Open Crepant Transformation Conjecture for toric Calabi-Yau 3-orbifolds*, J. Differential Geom. **130** (2025), 27–70.
2. *Open WDVV equations and Frobenius structures for toric Calabi-Yau 3-folds*, with Zhengyu Zong, Forum Math. Sigma **13** (2025), Paper No. e76, 29 pp.
3. *Open/closed BPS correspondence and integrality*, Commun. Math. Phys. **405**, 219 (2024), 34 pp.
4. *Open/closed correspondence via relative/local correspondence*, with Chiu-Chu Melissa Liu, Adv. Math. **410** (2022), Paper No. 108696, 43 pp.
5. *Symmetries of spatial graphs in 3-manifolds*, with Erica Flapan, Fundam. Math. **255** (2021), 289–308.
6. *Avoiding brooms, forks, and butterflies in the linear lattices*, with Shahriar Shahriari, Order **37** (2020), 223–242.

## RESEARCH PRESENTATIONS

1. *Remodeling Conjecture with descendants*, Caltech/USC Joint Algebra and Geometry Seminar, University of Southern California, Los Angeles, CA, USA, February 27, 2025.
2. *Remodeling Conjecture with descendants* (5-minute lightening talk), Workshop on Hyperkähler Varieties, Derived Categories, and Moduli Spaces, Columbia University, New York, NY, USA, February 8, 2025.
3. *Integrality in open and closed Gromov-Witten theory*, The 2024 Annual International Congress of Chinese Mathematicians (ICCM2024), Shanghai, China, January 4, 2025.
4. *Integrality in open and closed Gromov-Witten theory*, Symplectic Geometry and Mathematical Physics Seminar, Morningside Center of Mathematics, Chinese Academy of Sciences, Beijing, China, November 27, 2024.
5. *Open/closed correspondence via relative/local correspondence*, Symplectic Geometry and Mathematical Physics Seminar, Beijing International Center for Mathematical Research, Peking University, Beijing, China, November 12, 2024.
6. *Remodeling Conjecture with descendants*, BIRS-IASM Workshop on Noncommutative Geometry Meets Topological Recursion, Hangzhou, Zhejiang, China, September 26, 2024. [Recording]
7. *Integrality structures in open and closed Gromov-Witten theory*, Workshop on Enumerative Geometry, University of Oregon, Eugene, OR, USA, April 13, 2024.
8. *Open/closed correspondence and mirror symmetry*, Mathematics - String Theory Seminar, Kavli Institute for the Physics and Mathematics of the Universe, Kashiwa, Japan, March 28, 2024.

9. *Open WDVV equations and Frobenius structures for toric Calabi-Yau 3-folds*, Hebrew University Topology and Geometry Seminar, virtual, February 20, 2024.
10. *Knot invariants, Gromov-Witten invariants, and integrality conjectures*, Claremont Topology Seminar, Claremont, CA, USA, January 30, 2024.
11. *Open/closed correspondence and mirror symmetry*, Caltech/USC Joint Algebra and Geometry Seminar, California Institute of Technology, Pasadena, CA, USA, October 5, 2023.
12. *Open/closed correspondence and mirror symmetry*, Western Hemisphere Virtual Symplectic Seminar, virtual, February 17, 2023. [Recording]
13. *Open/closed correspondence and mirror symmetry*, Geometry and Physics Seminar, Boston University, Boston, MA, USA, December 7, 2022.
14. *Open Crepant Transformation Conjecture for toric Calabi-Yau 3-orbifolds*, Algebra Seminar, University of Oregon, Eugene, OR, USA, October 11, 2022.
15. *Orbifold open/closed correspondence*, Integrability, Enumerative Geometry and Quantization, Simons Center for Geometry and Physics, Stony Brook, NY, September 20, 2022. [Recording]
16. *Open/closed correspondence via relative/local correspondence*, MAP Meeting, Boston College, virtual, February 26, 2022. [Recording]
17. *Open/closed correspondence via relative/local correspondence*, Online Geometry and Physics Seminar, Institute for Advanced Study in Mathematics, Zhejiang University, virtual, January 4, 2022. [Recording]
18. *The Open Crepant Transformation Conjecture for toric Calabi-Yau 3-orbifolds*, Informal Mathematical Physics Seminar, Columbia University, virtual, May 11, 2020. [Recording]
19. *Symmetries of graphs in homology spheres*, AMS Session for Contributed Papers on Undergraduate Research, 2017 Joint Math Meetings, Atlanta, GA, USA, January 5, 2017.
20. *Symmetries of graphs in homology spheres*, International Workshop on Spatial Graphs (IWSG 2016), Waseda University, Tokyo, Japan, August 5, 2016.
21. *Forbidden configurations in the linear lattices*, Claremont Colleges Algebra, Number Theory, and Combinatorics Seminar, Claremont, CA, USA, March 1, 2016.
22. *Forbidden configurations in the linear lattices*, Budapest Semesters in Mathematics Colloquium, Budapest, Hungary, July 22, 2015.

## TEACHING AND MENTORING

### **Tsinghua**

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|--------------------------|-----------------------------------|
| 1. Qiuzhen Yizhou Mentor | Fall 2024, Spring 2025, Fall 2025 |
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### **Instructor, Caltech**

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|-------------------------|-------------|
| 1. Algebraic geometry C | Spring 2024 |
| 2. Algebraic geometry A | Fall 2023   |

### **Instructor, Columbia**

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|-------------------|-------------|
| 1. Linear algebra | Summer 2021 |
|-------------------|-------------|

2. Calculus II	Summer 2020
3. Topics in graph theory (undergraduate seminar)	Fall 2019
4. Elementary applied topology (undergraduate seminar)	Spring 2019

### **Teaching Assistant, Columbia**

1. Introduction to algebraic topology	Spring 2023
2. Topology	Fall 2022
3. Linear algebra	Spring 2022
4. Calculus II	Fall 2021, Spring 2021, Summer 2019
5. Modern algebra	Fall 2020
6. Calculus III	Spring 2020
7. Calculus I	Fall 2018

### **SEMINARS CO-ORGANIZED**

#### **Tsinghua**

1. Caltech-Tsinghua Joint Colloquium	Fall 2023 – Present
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#### **Caltech**

1. Southern California Algebraic Geometry Seminar	April 6, 2024
2. Learning seminar on quasimap theory	Winter 2024
3. Caltech/USC Joint Algebra and Geometry Seminar	2023–24

#### **Columbia**

1. Learning seminar on intersection theory	Fall 2018
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