SONG YU

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Employment

Caltech-Tsinghua Joint Postdoctoral Fellow

California Institute of Technology, Pasadena, CA, USA — August 2023 – July 2024

Tsinghua University, Beijing, China — October 2024 – Present

Education

Ph.D. in Mathematics, Columbia University, New York, NY, USA — September 2017 – May 2023

Advisor: Chiu-Chu Melissa Liu

Thesis: *Open/closed correspondence and mirror symmetry*

B.A. in Mathematics, Pomona College, Claremont, CA, USA — August 2013 – May 2017

Academic Advisor: Shahriar Shahriari

Thesis Advisor: Erica Flapan

Thesis: *Symmetries of spatial graphs in homology spheres*

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. *Multi-component open/relative/local correspondence*, with Ke Zhang, Zhengyu Zong, `arXiv:2512.15074`.
2. *Quantum cohomology of variations of GIT quotients and flips*, with Zhaoxing Gu, Tony Yue Yu, `arXiv:2508.15770`.

3. *Hodge-theoretic open/closed correspondence*, arXiv:2507.09941.
4. *Remodeling Conjecture with descendants*, with Bohan Fang, Chiu-Chu Melissa Liu, Zhengyu Zong, arXiv:2504.15696.
5. *Orbifold open/closed correspondence and mirror symmetry*, with Chiu-Chu Melissa Liu, arXiv: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 and its recent developments*, Geometry and Physics Seminar, Tsinghua University, Beijing, China, December 9, 2025.
2. *Quantum cohomology of VGIT and flips*, SCMS-SIMIS Enumerative Geometry Seminar, Shanghai Center for Mathematical Sciences, Fudan University, Shanghai, China, December 3, 2025.
3. *Quantum cohomology of VGIT and flips*, Symplectic Geometry and Mathematical Physics Seminar, Beijing International Center for Mathematical Research, Peking University, Beijing, China, November 25, 2025.
4. *Hodge-theoretic open/closed correspondence and integral structures*, Caltech/USC Joint Algebra and Geometry Seminar, California Institute of Technology, Pasadena, CA, USA, November 13, 2025.
5. *Remodeling Conjecture with descendants*, Caltech/USC Joint Algebra and Geometry Seminar, University of Southern California, Los Angeles, CA, USA, February 27, 2025.
6. *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.
7. *Integrality in open and closed Gromov-Witten theory*, The 2024 Annual International Congress of Chinese Mathematicians (ICCM2024), Shanghai, China, January 4, 2025.
8. *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.

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

Teaching and Mentoring

Tsinghua

1. Qiuzhen Yiyou Mentor — Fall 2024, Spring 2025, Fall 2025

Instructor, Caltech

1. Algebraic geometry C — Spring 2024
2. Algebraic geometry A — Fall 2023

Instructor, Columbia

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

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