

# Zeng, Ruofan (Michael)

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University of Washington | Padelford C-20, Seattle, WA

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## EDUCATION

### University of Washington

September 2023 - Present

- PhD student in Mathematics (GPA: 3.98/4.00)
- Honors: McFarlan Fellowship, Provost's Fellowship, Tseng Fellowship

### University of Pennsylvania

August 2020 - May 2023

- Master of Arts (Applied Math and Computer Science) (GPA: 3.88/4.00)
- Bachelor of Arts (Mathematics, Linguistics) (GPA: 3.92/4.00)
- Honors: Summa Cum Laude, Dean's lists (21-23), Distinction in Mathematics, Freiwald Scholars Award (2020)

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## PUBLICATION

1. Appendix. M. Harada and M. Precup. "Torus fixed point sets of Hessenberg Schubert varieties in regular semisimple Hessenberg varieties." Osaka J. Math. 60 (2023), 637–652. <https://doi.org/10.48550/arXiv.2112.13250>.
2. Quantitative Orthographic Analysis of the *Ogura Shikishi* with Paul Atkins. 86 pages, 2024. To appear in *Monumenta Nipponica*.

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## CONFERENCES & SUMMER SCHOOLS

- Park City Math Institute 2024: Motivic Homotopy Theory July 2024
- iWoAT: International Workshop on Algebraic Topology at Fudan University June 2024
- iWoAT: International Workshop on Algebraic Topology at SUSTech December 2023
- Western Algebraic Geometry Symposium at WUSTL October 2023
- iWoAT: International Workshop on Algebraic Topology at Peking University July 2023
- Macaulay2 Workshop at the University of Minnesota June 2023
- Minicourse on Mapping Class Groups of 4-Manifold at UChicago August 2022
- ISM Discovery School: Geometry and Combinatorics of Hessenberg Varieties June 2022

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## RESEARCH PROJECTS

### Syzygetic Quadruples of Plane Quartics

July 2024 - Present

- Ongoing research on special line configurations associated with a plane quartic, where the Weyl group of the 28 bitangents acts by monodromy.

## Quantitative Analysis in Digital Humanities

2023-2024

- An interdisciplinary collaboration with Dr. Paul Atkins, Department of Asian Languages & Literature.
- Analyzed the authorship of the renowned Japanese anthology *Ogura Shikishi* by novel machine learning and statistical methods concerning the frequencies of character variants.

## Macaulay2 Workshop

Summer 2023

- Contributed to `Brackets` package, which symbolically computes the Grassmann-Cayley algebra.
- Added Grassmannian and SAGBI strategies to speed up Gröbner basis computation in the GC-algebra.
- Added Pascal's theorem and "common transversals to 4 lines" to examples. Supplied documentation.

## Independent Study: Analysis on locally compact groups

Summer 2022

- Supervised by Dr. Jean Gallier, studied analysis on locally compact groups and neural networks with group equivariance.
- Devised experiments and confirmed dimension reduction phenomena in training trajectories of deep learning models.

## Research Experience for Undergraduates (REU)

Summer 2020 and 2021

- Freiwald Scholars Program at WUSTL (2020): combinatorics of Hessenberg varieties, supervised by Dr. Martha Precup.
- POLYMATH Jr. REU (2021): knot theory, supervised by Dr. Alexander Zupan.

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## TEACHING

### MATH 581C Intersection Theory

SP 2024

- Supervised by Dr. Sándor Kovács, co-taught the topics course on intersection theory with Arkamouli Debnath.
- Lectured 3 times per week in alternating weeks. Created lecture notes and 3D-printing demonstrations.
- Facilitated additional seminar talks by professors and classmates.
- Notes, class schedule, and more details are available at [sites.google.com/view/uwmath583cintersectiontheory](https://sites.google.com/view/uwmath583cintersectiontheory).

### University of Washington Directed Reading Program (WDRP)

- Mentor for *Enumerative Geometry, Incidence Geometry, Projective Geometry* SP 2024
- Mentor for *Lie groups are not a lie: they are everywhere* WI 2024

### University of Washington

- Grader for MATH300 Introduction to Mathematical Reasoning SU 2024
- TA for MATH125 BA Calculus with Analytic Geometry III SP 2024
- TA for MATH125 BB Calculus with Analytic Geometry III SP 2024
- TA for MATH125 CD Calculus with Analytic Geometry II WI 2024
- TA for MATH125 CC Calculus with Analytic Geometry II WI 2024
- TA for MATH125 CE Calculus with Analytic Geometry II FL 2023
- TA for MATH125 CF Calculus with Analytic Geometry II FL 2023

### University of Pennsylvania

- TA for CIS5150 Linear Algebra for Computer Science FL 2022

### Washington University in St. Louis

- TA for MATH429 Linear Algebra FL 2019

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## SEMINARS

### Electronic Computational Homotopy Theory (eCHT)

- Enrolled in Quadratic Curve Counting and the Kan Seminar FL 2024
- Enrolled in Algebraic Vector Bundles FL 2023

### University of Washington

- *Organizer* of Intersection Theory SP 2024
- *Co-organizer* of Coxeter Reading Group WI, SP 2024
- *Co-organizer* of Symmetric Functions and Representations of Symmetric Group WI 2024

### University of Pennsylvania

- *Organizer* of Reading Seminar on Vertex Operator Algebras FL 2022
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## SEMINAR TALKS

### University of Washington

- DupTop Seminar: Properties of the Steenrod Squares SP 2024
- 1-2-3 Seminar: 27 Lines on a Cubic Surface — via Classifying Spaces? WI 2024
- DubTop Seminar: Steenrod Cup-i Coproducts via Zonotopal Tilings WI 2024
- Student AG Seminar: A Leisurely Introduction to Algebraic K-Theory FL 2023

### University of Pennsylvania

- Homotopy Fixed Points of a G-Category SP 2022
  - An Overview of Persistent Homology and its Applications SP 2022
  - Penn DRP: A Primer on Classifying Spaces FL 2021
  - Class talk: Whitney Embedding Theorem FL 2021
  - Penn DRP: Whitehead's Theorem and Hurewicz's Theorem SP 2021
  - WUSTL Undergraduate Research Symposium: Combinatorics of Hessenberg Varieties FL 2020
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## RELEVANT SKILLS

### *Software & programming*

Python, C++, Java, R, LaTeX

Mathematica, Macaulay2, SageMath, Polymake

Rhinoceros, Shapr3D, ArcGIS

### *Modern languages*

Chinese—*Mandarin* (native), *Cantonese* (professional)

English (professional)

Japanese (professional)

German (intermediate)

Russian (basic conversations)

Korean (basic conversations)

*Ancient languages*

Classical Chinese (advanced)

Classical Japanese (advanced)

Ancient Greek (basic)

Old English (intermediate)