Zeng, Ruofan (Michael)

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EDUCATION

University of Washington expected June 2028

- PhD student in mathematics
- Honors: McFarlan Fellowship, Provost's Fellowship

University of Pennsylvania May 2023

- Bachelor of Arts (Mathematics, Linguistics) (GPA: 3.93/4.00)
- Master of Arts (Applied Math and Computer Science, submatriculation) (GPA: 3.92/4.00)
- Honors: Summa Cum Laude, Dean's lists (21-23), distinction in mathematics, Freiwald Scholars Award (2020)

PUBLICATION

- Appendix. M. Harada and M. Precup. "Torus fixed point sets of Hessenberg Schubert varieties in regular semisimple Hessenberg varieties." arXiv, 2021. https://doi.org/10.48550/arXiv.2112.13250.

CONFERENCES / SUMMER SCHOOLS

- iWoAT: International Workship on Algebraic Topology at Peking University July 2023
- Macaulay2 Workshop at University of Minnesota June 2023
- ISM Discovery School: Geometry and Combinatorics of Hessenberg Varieties June 2022
- The Circle at Infinity: An International Colloquium in Honor of Curtis T. McMullen June 2022
- Mapping Class Groups of 4-Manifolds (Minicourse) August 2022

INTERNSHIP

Data Analyst Intern, **China Electric Power Research Institute** July – August 2023

- Collaborated on a team of 4 in the Perceptive Intelligence Lab.
- Processed geographical information and optimized routing and scheduling of a drone network to service 7,000 transmission towers via Bender's decomposition and evolutionary algorithms.

RESEARCH / INDEPENDENT STUDY

Macaulay2 Workshop: Brackets June 3–9 2023

- Attended minicourses
- Fixed errors, added new functionalities, examples, and documentation to the Brackets package.

Reading Seminar: Vertex Operator Algebras September 2022—ongoing

- Supervised by Angela Gibney (Penn), studied affine Lie algebras, vertex operator algebras, and their modules.
- Gave class talks on Lie algebras and their representations, the definition of vertex operator algebras, duality and contragredient modules, calculus of formal power series, and Monstrous Moonshine.

Independent Study: Analysis on locally compact groups June 2022—ongoing

- Supervised by Jean Gallier (Penn), studied analysis on locally compact groups and G-invariant neural networks.
- Research in progress to determine if two ways of defining the Fourier transform on SE3 are equivalent.

Directed Reading Program (FL21) September 2021—December 2021

- Read selected chapters from *Simplicial Homotopy Theory* (Goerss & Jardine) and numerous write-ups. Topics include simplicial sets, model categories, homotopy colimits, classifying spaces, and Quillen's Theorems A and B.

Directed Reading Program (SP21) January 2021—May 2021

- Read selected chapters from *Algebraic Topology* (Hatcher), *A Concise Course in Algebraic Topology* (May), and *Rational Homotopy Theory and Differential Forms* (Griffiths & Morgan).

POLYMATH Jr. REU June 2021—August 2021

- Worked in a group led by Alexander Zupan (Nebraska) and researched on knotted surfaces in dimension four.
- Tabulated knotted surfaces, converted other diagrams to tri-plane diagrams, and proved conjectures on orientability.

Freiwald Scholars Program February 2020—November 2020

- Mentored by Martha Precup (WUSTL) and researched on the combinatorics of regular Hessenberg varieties.
- Presented results at the Undergraduate Research Symposium (WUSTL, FL20).
- Wrote appendix for a paper by Megumi Harada and Martha Precup.

TEACHING EXPERIENCE

Teaching Assistant (Penn CIS5150 Linear Algebra for Computer Science) September 2022—ongoing

- Instructor: Jean Gallier (Penn).
- Graded homeworks, held office hours, and organized math workshops each week.

Teaching Assistant (WUSTL MATH429 Linear Algebra) January 2020—May 2020

- Instructor: Aliakbar Daemi (WUSTL).
- Graded homework and held office hours.

MATH TALKS

- Class talks: Vertex Operator Algebra (Penn MATH8100, FL22)
- Class talk: Homotopy Fixed Points of a G-Category (Penn MATH520, SP22)
- Class talk: An Overview of Persistent Homology and its Applications (Penn AMCS603, SP22)
- DRP talk: A Primer on Classifying Spaces (Penn DRP, FL21)
- Class talk: Whitney Embedding Theorem (Penn MATH600, FL21)
- DRP talk: Whitehead's Theorem and Hurewicz's Theorem (Penn DRP, SP21)
- Freiwald Scholars: Combinatorics of Hessenberg Varieties (WUSTL Undergraduate Research Symposium, FL20)
- Class talk: Free Abelian Groups and Free Groups (WUSTL MATH430, SP20)

LANGUAGES

Modern languages

Chinese—*Mandarin* (native)
Japanese (professional, 6 years)
German (intermediate, 2 years)
Korean (beginning, 1 semester)
English (professional, > 6 years of study)
Chinese—*Cantonese* (professional, 4 years)
Russian (beginning, 1 year)

Ancient languages

Classical Chinese (advanced)
Ancient Greek (beginning, 1 year)
Classical Japanese (advanced, 3 years)
Old English (beginning, 1 year)

SKILLS

C++, java, python, R, Mathematica, SageMath, Macaulay2, ArcGIS
Natural language processing