

Yifei Zhu

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Department of Mathematics

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POSITIONS

Southern University of Science and Technology, Shenzhen, Guangdong, China

Tenure-track assistant professor, February 2020 to present

Visiting assistant professor, December 2016 to January 2020

Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing, China

Visiting scholar, October 2016 to January 2017

Northwestern University, Evanston, Illinois, USA

Visiting assistant professor, September 2013 to August 2016

Mentor: Paul Goerss

EDUCATION

University of Minnesota, Twin Cities, Minnesota, USA

Ph.D. in Mathematics, June 2013

Advisor: Tyler Lawson

Peking University, Beijing, China

B.S. in Mathematics, July 2007

RESEARCH INTERESTS

Algebraic topology and related fields, particularly algebraic geometry and number theory.

PUBLICATIONS

Norm coherence for descent of level structures on formal deformations

Journal of Pure and Applied Algebra **224** (2020), no. 10, 106382, 35 pp.

DOI: [10.1016/j.jpaa.2020.106382](https://doi.org/10.1016/j.jpaa.2020.106382)

Morava E-homology of Bousfield–Kuhn functors on odd-dimensional spheres

Proceedings of the American Mathematical Society **146** (2018), no. 1, 449–458.

DOI: [10.1090/proc/13727](https://doi.org/10.1090/proc/13727)

Semistable models for modular curves and power operations for Morava E-theories of height 2

Advances in Mathematics **354** (2019), 106758, 29 pp.

DOI: [10.1016/j.aim.2019.106758](https://doi.org/10.1016/j.aim.2019.106758)

The Hecke algebra action and the Rezk logarithm on Morava E-theory of height 2

Transactions of the American Mathematical Society **373** (2020), no. 5, 3733–3764.

DOI: [10.1090/tran/8032](https://doi.org/10.1090/tran/8032)

The power operation structure on Morava E-theory of height 2 at the prime 3

Algebraic and Geometric Topology **14** (2014), no. 2, 953–977.

DOI: [10.2140/agt.2014.14.953](https://doi.org/10.2140/agt.2014.14.953)

AWARDS AND FELLOWSHIPS

2019 Fourth Young Faculty Teaching Competition, Second place,
Southern University of Science and Technology.

2018–2020 National Natural Science Foundation of China grant 11701263,
“Methods of algebraic geometry and number theory in algebraic topology.”

2018–2020 Finance Commission of Shenzhen Municipality start-up research grant.

2017–2022 Overseas High-Caliber Personnel (Level C) fellowship, Shenzhen.

2007–2013 Teaching assistantship, University of Minnesota.

2007 Outstanding Graduating Student award, Peking University.

2005–2006 Outstanding Student award, School of Mathematical Sciences, Peking University.

CONFERENCE PRESENTATIONS

Generalized modular forms in topology

Conference on Low Dimensional Topology, Southern University of Science and Technology, Shenzhen, November 2020.

Algebraic topology and arithmetic

Fudan-Guanghua International Forum for Young Scholars, Fudan University, Shanghai, December 2019.

Algebraic topology and arithmetic

2019 Young Mathematician Forum, Beijing International Center for Mathematical Research, Peking University, Beijing, December 2019.

Power operations in elliptic cohomology and related arithmetic topics

Special Session on Algebraic and Geometric Topology, AMS-CMS Joint International Meeting, Shanghai, June 2018.

Toward calculating unstable higher-periodic homotopy types

International Workshop on Algebraic Topology, Southern University of Science and Technology, Shenzhen, June 2018.

Symmetry encoded by norm maps

International Workshop on Loop Spaces, Supersymmetry and Index Theory, Chern Institute of Mathematics, Tianjin, July 2017.

Algebraic geometry of ring spectra and multiplicative invariants for families of manifolds

Workshop on Algebraic and Geometric Topology, Nankai University School of Mathematical Sciences, Tianjin, June 2017.

Toward calculating unstable higher-periodic homotopy types (scheduled)

AMS Special Session on Homotopy Theory, Sectional Meeting, Bloomington, April 2017.

Session on chromatic power operations, with P. Nelson and P. VanKoughnett

Operations in Highly Structured Homology Theories, Banff, May 2016.

Modular equations for Lubin–Tate formal groups at chromatic level 2

AMS Session on Algebraic Geometry, Joint Meetings, Seattle, January 2016.

Power operation calculations in elliptic cohomology

AMS Special Session on Homotopy Theory, Joint Meetings, Baltimore, January 2014.

CONFERENCE ORGANIZING

International Workshop on Algebraic Topology 2020, postponed

International conference, 5 days.

Joint organizer with A. Beaudry, M. Behrens, D. Isaksen, J. Kong, R. Liu, X.D. Shi, G. Wang, Z. Xu.

Beijing International Center for Mathematical Research, Peking University, August 17–21, 2020.

Summer School on Higher (Infinity-Categorical) Algebra, postponed

International conference, 5 days.

Joint organizer with A. Beaudry, M. Behrens, D. Isaksen, J. Kong, Z. Lü, X.D. Shi, G. Wang, Z. Xu.

Shanghai Center for Mathematical Sciences, Fudan University, August 10–14, 2020.

International Workshop on Algebraic Topology 2019

International conference, 3 days, 140 participants.

Joint organizer with A. Beaudry, M. Behrens, D. Isaksen, J. Kong, Z. Lü, G. Wang, Z. Xu.

Shanghai Center for Mathematical Sciences, Fudan University, August 19–21, 2019.

Summer School on Equivariant Stable Homotopy Theory

International conference, 5 days, 140 participants.

Joint organizer with A. Beaudry, M. Behrens, D. Isaksen, J. Kong, Z. Lü, G. Wang, Z. Xu.

Shanghai Center for Mathematical Sciences, Fudan University, August 13–17, 2019.

Special Session on Algebraic and Geometric Topology, AMS-CMS Joint International Meeting

International conference, 4 days, 50 participants.

Joint organizer with M. Hill, Z. Lü, and J. Ma.

Fudan University, Shanghai, June 11–14, 2018.

International Workshop on Algebraic Topology

International conference, 4 days, 70 participants.

Joint organizer (principal) with A. Beaudry, M. Behrens, Z. Huan, H. Miller, N. Stapleton, G. Wang, Z. Xu.

Southern University of Science and Technology, Shenzhen, June 6–9, 2018.

Operations in Highly Structured Homology Theories

International conference, 5 days, 40 participants.

Organizer for Session on Chromatic Power Operations.

Banff International Research Station, May 22–27, 2016.

SEMINAR TALKS

Algebraic topology and arithmetic

Southern University of Science and Technology, December 2019.

Power operations in elliptic cohomology and semistable models for modular curves

Chinese Academy of Sciences Topology Seminar, November 2018.

Toward calculating unstable higher-periodic homotopy types

Electronic Computational Homotopy Theory Seminar (through the online platform Zoom for an international community), April 2018.

Power operations in elliptic cohomology and moduli of elliptic curves

Nankai University, November 2016.

Toward calculating unstable higher-periodic homotopy types

Chinese Academy of Sciences Topology Seminar, November 2016.

Power operation calculations in elliptic cohomology

Southern University of Science and Technology, October 2016.

Modular equations and Hecke operators for local elliptic spectra

University of Chicago Topology Seminar, January 2016.

Local moduli for elliptic spectra

University of Notre Dame Topology Seminar, January 2016.

Computing power operations for Morava E-theory of height 2 at a prime

University of Rochester Topology Seminar, October 2015.

The Hecke algebra action on Morava E-theory of height 2

University of Illinois at Urbana-Champaign Topology Seminar, October 2014.

Finite subgroups of a formal group of height 2 over \mathbb{F}_9

University of Louisiana at Lafayette Topology Seminar, March 2014.

A formal group of height 2 over \mathbb{F}_9

Northwestern University Topology Seminar, October 2013.

Power operations in height-2 Morava E-theory and its $K(1)$ -localization

University of Illinois at Urbana-Champaign Topology Seminar, September 2013.

Power operations in an elliptic cohomology theory

University of Minnesota Topology Seminar, April 2013.

Computing power operations in Morava E-theory at height 2 for the prime 3

Wayne State University Topology Seminar, March 2013.

The structure of power operations in Morava E-theory at height 2 for the prime 3

University of Chicago Algebraic Topology Seminar, March 2013.

Computing power operations for Morava E-theory of height 2 at the prime 3

University of Virginia Topology Seminar, February 2013.

SELECTED CONFERENCES AND WORKSHOPS

Workshop on Arithmetic Topology

Pacific Institute for the Mathematical Sciences, University of British Columbia, Vancouver,
June 10–14, 2019.

Arbeitsgemeinschaft: Topological Cyclic Topology

Mathematisches Forschungsinstitut, Oberwolfach, April 1–7, 2018.

West Coast Algebraic Topology Summer School

On connections between algebraic topology and number theory.

University of Oregon, Eugene, August 8–12, 2016.

Operations in Highly Structured Homology Theories

Organizer and speaker, Session on Chromatic Power Operations.
Banff International Research Station, May 22–27, 2016.

Mid-Atlantic Topology Conference—in honor of Nick Kuhn

University of Virginia, Charlottesville, April 25–26, 2015.

West Coast Algebraic Topology Summer School

University of Washington, Seattle, August 26–28, 2011.

New Contexts in Homotopy Theory—in honor of Peter May

University of Chicago, Chicago, October 16–18, 2009.

SEMINAR ORGANIZING

- 2020–present Southern University of Science and Technology, Mathematics Colloquium
Joint organizer with I. Irmer.
- 2017–present Southern University of Science and Technology, Geometry & Topology Seminar
Joint organizer with S. Garoufalidis and Q. Li.
- 2011–2012 University of Minnesota, Student Topology Seminar
Joint organizer with D. Bashkirov, R. Hank, and E. Manlove.
Collaboratively designed and created wiki pages for the seminar.

TEACHING EXPERIENCE

Southern University of Science and Technology

- Courses taught:
 - MA101a Mathematical Analysis I
 - MA102a Mathematical Analysis II
 - MA301 Functions of Real Variables
 - MA323 Topology
 - MA327 Differential Geometry
 - MAT8010 Combinatorics (graduate level)
 - MAT8021 Algebraic Topology (graduate level), current
 - MAT8024 Differentiable Manifolds (graduate level)
- Graduate advising: Liu Jizhang (2019 to present), Wu Yifan (2020 to present), Ma Xuecai (2020 to present), Liang Weiqiu (2020 to present), Yi Siheng (2021 to present).

- Undergraduate advising: Liu Jizhang (2017–2019), Zhu Yaxi (2018–2020), Gao Zican (2018–2019, thesis only), Liang Tongtong (2019 to present), Lin Ruijun (2019 to present), Liao Wenbo (2019 to present), Yu Jinghao (2019 to present), Ruan Xiabing (2019 to present), Wang Mingjie (2020 to present), Xu Linfeng (2020 to present), Liu Lingfeng (2020 to present), Xu Ruoyu (2020 to present), Ling Shuo (2020 to present), Jiao Miaosen (2020 to present), Zhu Zijing (2020 to present), Wang Yukai (2020 to present, thesis only).
- Tutorial fellow, Shuli College, advising 3 students of Class 2020, 7 students of Class 2019, and 12 students of Class 2017. Led a discussion session on math course study for freshmen of the College in Fall 2018 with three teaching-track faculty members.

Northwestern University

- Courses taught:
 - Math 230 Differential Calculus of Multivariable Functions
 - Math 234 Multiple Integration and Vector Calculus
 - Math 240 Linear Algebra
 - Math 300 Foundations of Higher Mathematics
- Regularly served as course coordinator for Math 230—the most-enrolled calculus course with the largest instructor group.
- Served as faculty mentor for Math 230's *Gateway Science Workshop* program for two consecutive terms, with recognition from the Provost.
- Involved in *Math Review Study Tables*—drop-in question and answer / group study sessions run prior to calculus exams in residence halls, initiated and co-sponsored by the Office of Residential Academic Initiatives and the Department of Mathematics.
- Involved in piloting the use of *Crowdmark*—a collaborative online grading and analytics platform, with recognition from the Mathematics Department Chair. Experienced with technology and administrative matters.
- Involved in transitioning common calculus course websites from *Blackboard* to *Canvas*.

University of Minnesota

- Teaching assistant for courses:
 - Math 1151 Precalculus II
 - Math 1271 Calculus I
 - Math 2263 Multivariable Calculus
 - Math 8602 Real Analysis
- Teaching assistant training, 2007. One of two (among 15) international math graduate students who were exempted from language classes.