Tao Gong

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Research Interests

Algebraic topology, homotopy theory, toric topology.

Education

Western University	**Ontario, Canada**
Ph.D. in Mathematics	*2022/09–2026/07 (expected)*
Supervisor: Matthias Franz	
Beijing Normal University	**Beijing, China**
M.S. in Mathematics	*2019/09–2022/07*
Supervisor: Xu'an Zhao	
Beijing Normal University	**Beijing, China**
B.S. in Mathematics	*2015/09–2019/07*

Papers

Preprints

Toric varieties modulo reflections
Joint with Colin Crowley, Connor Simpson. Available at arXiv:2410.14653.

Homotopy types of toric orbifolds from Weyl polytopes
Available at arXiv:2407.16070.

Theses

Integral cohomology of classifying spaces of projective unitary groups
Master's thesis

Cohomology of classifying spaces of rank-two Kac–Moody groups of finite type
Bachelor's thesis

Selected Projects

RealQuo.jl: A Julia package for quotients of real toric permutohedron varieties
Joint with Colin Crowley, Connor Simpson.   *2025/10*
Available at `https://github.com/ggttaaoo/RealQuo`.

Topological Data Analysis to Support Image Analysis Tasks in Environmental Science
Joint with Kumar Sannidhya Shukla, Prajwal Dhondiram Udanshive.   *2025/04*
A project in the Fields Graduate Course: Introduction to Topological Data Analysis.

Comparison and optimization of training programs of emerging colleges based on students' perspectives
Joint with Chengjie Jiao, Liuyi Yang.   *2018/05*

A statistical project in Undergraduate Research Training & Creative Ability Cultivation.

Energy profile prediction and evaluation based on the GM model and ETP criteria
Joint with Chengjie Jiao, Jing Wang.   *2017/09*
An entry for the Contest in Modeling/Interdisciplinary Contest.

A study on school education models from the perspective of college students
Joint with Chengjie Jiao, Liuyi Yang.   *2017/05*
A statistical project in Scientific Research Training and Creative Ability Cultivation.

Selected Talks

Workshop on Toric Topology   **Ontario, Canada**
Fields Institute   *2024/08*
○ Homotopy types of quotients of toric varieties from Weyl groups

Transformation Groups Seminar   **Ontario, Canada**
Western University   *2022–2025*
○ Simple homotopy theory
○ Contractibility of quotients of real toric varieties from Weyl groups
○ Weyl group actions on the coweight lattice modulo two
○ Homotopy types of toric orbifolds from Weyl polytopes
○ Introduction to root systems and Weyl groups

Graduate Seminar   **Ontario, Canada**
Western University   *2022–2025*
○ Real toric surfaces modulo reflections
○ What is the space of conjugacy classes?

Math Seminar   **Beijing, China**
Beijing Normal University   *2015–2022*
○ Lie algebra models for homotopy theory
○ Stable homotopy theory
○ Spectral sequences
○ Topological quantum field theory

Service

Teaching Experience

Teaching Aid Program   **Anhui, China**
A volunteer project deployed to a rural primary school   *2016/08*

Teaching Aid Program   **Fujian, China**
A volunteer project deployed to a middle school   *2017/08*

Teaching Assistantships

Western University   **Ontario, Canada**

- MATH 1228 (2023 Summer, 2022 Fall)
- CALCULUS 1501 (2025 Winter, 2023 Winter)
- MATH 2151 (2023 Fall)
- MATH 3152 (2023 Fall)
- APPLMATH 1201 (2025 Winter, 2024 Summer, 2024 Winter)
- MATH 1229 (2024 Fall)
- MATH 1600 (2024 Fall)
- MATH 2124 (2024 Fall)
- CALCULUS 1000 (2025 Summer)
- Help Center (2025 Summer)

Beijing Normal University   **Beijing, China**

- Differential Geometry (2021 Fall)
- Algebraic Topology (2021 Spring)
- Analytic Geometry (2020 Fall, 2019 Fall)
- Lie Groups and Lie Algebras (2022 Fall)

Honors and Awards

Western Graduate Research Scholarship

2022–2026

Scholarship of Beijing Normal University (Graduate)

2020–2021

National Encouragement Scholarship

2017–2018

Scholarship of Beijing Normal University (Undergraduate)

2016–2018

Meritorious Winner in the Contest in Modeling/Interdisciplinary Contest

2017/09

Languages

Mandarin, English.

Computer Skills

Languages: C++, Python, Julia   **Math Tools**: MATLAB, Maple, Macaulay2
Statistical Tools: SAS, SPSS