

Tao Gong

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Research Interests

Algebraic topology, homotopy theory, toric topology.

Education

Western University <i>Ph.D. in Mathematics</i> Supervisor: Matthias Franz	Ontario, Canada 2022/09–2026/06 (expected)
Beijing Normal University <i>M.S. in Mathematics</i> Supervisor: Xu'an Zhao	Beijing, China 2019/09–2022/07
Beijing Normal University <i>B.S. in Mathematics</i>	Beijing, China 2015/09–2019/07

Papers

Preprints

Toric varieties modulo reflections

Joint with Colin Crowley, Connor Simpson. Available at [arXiv:2410.14653](https://arxiv.org/abs/2410.14653)

Homotopy types of toric orbifolds from Weyl polytopes

Available at [arXiv:2407.16070](https://arxiv.org/abs/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.

Available at github.com/ggttaooo/RealQuo.

2025/10

Topological Data Analysis to Support Image Analysis

Tasks in Environmental Science

Joint with Kumar Sannidhya Shukla, Prajwal Dhondiram Udanshive.

A project in the Fields Graduate Course: Introduction to Topological Data Analysis.

2025/04

Energy profile prediction and evaluation based on the GM model and ETP criteria

Joint with Chengjie Jiao, Jing Wang.

2018/02

An entry for the Contest in Modeling/Interdisciplinary Contest.

Selected Talks

Advances in Homotopy Theory IX by CGTA & BIMSA	Virtual 2026/01
○ Quotients of toric permutohedral varieties	
School of Mathematical Sciences at Beijing Normal University	Beijing, China 2025/12
○ Quasitoric manifolds, small covers, and Weyl groups	
Institute for Advanced Study in Mathematics of HIT	Harbin, China 2025/12
○ Homotopy types of quotients of toric varieties from Weyl groups	
Workshop on Toric Topology at Fields Institute	Ontario, Canada 2024/08
○ Homotopy types of quotients of toric varieties from Weyl groups	
Transformation Groups Seminar at Western University	Ontario, Canada 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 at Western University	Ontario, Canada 2022–2025
○ Real toric surfaces modulo reflections	
○ What is the space of conjugacy classes?	
Math Seminar at Beijing Normal University	Beijing, China 2015–2022
○ Lie algebra models for homotopy theory	
○ Stable homotopy theory	
○ Spectral sequences	
○ Topological quantum field theory	
○ Knot theory	

Service

Teaching Experience	
Advanced Teaching Program	Western University, Canada
<i>A project for designing a syllabus and conducting microteaching</i>	2025/11
Teaching Aid Program	Anhui, China
<i>A volunteer project deployed to a rural primary school</i>	2016/08
Teaching Aid Program	Fujian, China
<i>A volunteer project deployed to a middle school</i>	2017/08

Teaching Assistantships.....

Western University Ontario, Canada

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

Beijing Normal University Beijing, China

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

Selected 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	2018/04

Languages

Mandarin, English.

Computer Skills

Languages: C++, Python, Julia

Math Tools: MATLAB, Maple, Macaulay2

Statistical Tools: SAS, SPSS