

# Tao Gong

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## Research Interests

Algebraic topology, homotopy theory, toric topology.

## Education

### Western University

*Ph.D. in Mathematics*

Supervisor: Matthias Franz

**Ontario, Canada**

2022/09–2026/06 (expected)

### Beijing Normal University

*M.S. in Mathematics*

Supervisor: Xu'an Zhao

**Beijing, China**

2019/09–2022/07

### Beijing Normal University

*B.S. in Mathematics*

**Beijing, China**

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 [github.com/ggttaaoo/RealQuo](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.

### 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

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<b>Advances in Homotopy Theory IX by CGTA &amp; BIMSA</b>	<b>Virtual</b>
	<i>2026/01</i>
<ul style="list-style-type: none"><li>○ Quotients of toric permutohedral varieties</li></ul>	
<b>School of Mathematical Sciences at Beijing Normal University</b>	<b>Beijing, China</b>
	<i>2025/12</i>
<ul style="list-style-type: none"><li>○ Quasitoric manifolds, small covers, and Weyl groups</li></ul>	
<b>Institute for Advanced Study in Mathematics of HIT</b>	<b>Harbin, China</b>
	<i>2025/12</i>
<ul style="list-style-type: none"><li>○ Homotopy types of quotients of toric varieties from Weyl groups</li></ul>	
<b>Workshop on Toric Topology at Fields Institute</b>	<b>Ontario, Canada</b>
	<i>2024/08</i>
<ul style="list-style-type: none"><li>○ Homotopy types of quotients of toric varieties from Weyl groups</li></ul>	
<b>Transformation Groups Seminar at Western University</b>	<b>Ontario, Canada</b>
	<i>2022–2025</i>
<ul style="list-style-type: none"><li>○ Simple homotopy theory</li><li>○ Contractibility of quotients of real toric varieties from Weyl groups</li><li>○ Weyl group actions on the coweight lattice modulo two</li><li>○ Homotopy types of toric orbifolds from Weyl polytopes</li><li>○ Introduction to root systems and Weyl groups</li></ul>	
<b>Graduate Seminar at Western University</b>	<b>Ontario, Canada</b>
	<i>2022–2025</i>
<ul style="list-style-type: none"><li>○ Real toric surfaces modulo reflections</li><li>○ What is the space of conjugacy classes?</li></ul>	
<b>Math Seminar at Beijing Normal University</b>	<b>Beijing, China</b>
	<i>2015–2022</i>
<ul style="list-style-type: none"><li>○ Lie algebra models for homotopy theory</li><li>○ Stable homotopy theory</li><li>○ Spectral sequences</li><li>○ Topological quantum field theory</li><li>○ Knot theory</li></ul>	

## Service

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

## **Teaching Assistantships**

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**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**

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**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**

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Mandarin, English.

## **Computer Skills**

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**Languages:** C++, Python, Julia

**Math Tools:** MATLAB, Maple, Macaulay2

**Statistical Tools:** SAS, SPSS