

# BAILEY WHITBREAD

**Address:** School of Mathematics and Physics, The University of Queensland, St Lucia, Australia.

**Website:** [www.baileywhitbread.com](http://www.baileywhitbread.com).

## RESEARCH INTERESTS

I am interested in representation theory, geometry and machine learning.

## EDUCATION

### Master of Philosophy

*The University of Queensland*

2022 - 2024

Brisbane, Australia

**Advisors:** Masoud Kamgarpour, Ole Warnaar.

**Thesis:** Arithmetic geometry of character varieties.

**Scholarships:** UQ Research Training Program scholarship (\$142,500).

### Bachelor of Mathematics, First Class Honours

*The University of Queensland*

2017 - 2021

Brisbane, Australia

**Advisors:** Masoud Kamgarpour, Anna Puskás.

**Thesis:** Hecke algebras and Gelfand pairs in representation theory.

**Scholarships:** UQ Academic Merit, UQ Link, and Smith Family Tertiary scholarships (\$25,000).

**Awards:** UQ Dean's Commendations for Academic Excellence.

## PAPERS

### Counting points on character varieties

Masoud Kamgarpour, GyeongHyeon Nam, Bailey Whitbread, Stefano Giannini  
[arXiv:2409.04735](https://arxiv.org/abs/2409.04735)

2024

Submitted

## CODE

### CharacterVarieties.jl

A package for computing E-polynomials of character varieties  
[github.com/baileywhitbread/CharacterVarieties.jl](https://github.com/baileywhitbread/CharacterVarieties.jl)

2024

Julia

## SERVICE

### Co-organiser

*UQ Maths Graduate Student Seminar*

2023 - 2024

Brisbane, Australia

Co-organised with Madeline Nurcombe, Alistair Falconer, and Alexander Lim.

Funded by Cecilia Gonzalez Tokman and Ramiro Lafuente.

### Co-organiser

*Weil Conjectures Lecture Series*

2023

Online

Taught by Masoud Kamgarpour and Angus McAndrew.

### Competition marker

*Simon Marais Mathematics Competition*

2022

Online

International competition for undergraduates.

Coordinated by Sean Gardiner.

**Competition marker** 2022  
*UQ/QAMT Problem Solving Competition*  
 Brisbane, Australia  
 State competition for high school students.  
 Coordinated by Michael Bulmer.

**Question drafter** 2021 - 2023  
*UQ Maths Relay*  
 Brisbane, Australia  
 Welcome event for undergraduates.  
 Coordinated by Ramiro Lafuente, Ole Warnaar and Masoud Kamgarpour.

**Exam marker** 2021 - 2024  
*The University of Queensland*  
 Brisbane, Australia  
 First and second year algebra and analysis final exams.

**Research assistant** 2021  
*The University of Queensland*  
 Brisbane, Australia  
 Working with students to improve clarity in writing.  
 Funded by Masoud Kamgarpour.

**Tutorial assistant** 2019 - 2024  
*The University of Queensland*  
 Brisbane, Australia  
 I may have been your tutor for the following:

MATH3303 Abstract Algebra & Number theory  
 MATH2401 Mathematical Analysis &  
 Advanced Topics  
 MATH2400 Mathematical Analysis  
 MATH2301 Linear & Abstract Algebra &  
 Number Theory

MATH2001 Calculus and Linear Algebra II  
 MATH1071 Advanced Calculus & Linear Algebra I  
 MATH1061 Discrete Mathematics  
 MATH1052 Multivariate Calculus & ODEs  
 MATH1051 Calculus & Linear Algebra I  
 First Year Learning Centre for Mathematics

Some tutor evaluations written by students of MATH3303:

*'Bailey was extremely knowledgeable in the subject, easily approachable, and is among one of the best tutors I've ever had during my time at UQ. From him, I have learnt not only course content, but how to be an effective educator.'*

*'Bailey has been hands-down the best maths tutor I have had. He was extremely approachable, and always encouraged questions. He would explain the theory very clearly and always made sure you had a good understanding of the concepts. This course would have been a lot harder without him as a tutor!'*

*'Bailey was very helpful and professional in the tutorials. He offered excellent help to all students and explained the challenging assignment questions with great clarity and insight.'*

*'Bailey is really good at putting different ideas into a wider context in algebra which can help guide intuition and also helps students gain a wider appreciation of what we are studying.'*

**Volunteer tutor** 2019  
*UQ Queensland Mathematics Summer School*  
 Brisbane, Australia  
 Summer school for senior high school students.  
 Coordinated by Andrew Stephenson.

**President and vice president** 2017 - 2019  
*UQ Mathematics Students Society*  
 Brisbane, Australia  
 Undergraduate student society.

## INVITED TALKS

**Arithmetic geometry of representation spaces**  
*University of Glasgow Algebra and Number Theory Seminar*

Sep 2023  
 Glasgow, Scotland

## TALKS

???  
*AMSI Summer School*  
 ???  
*68th Annual Meeting of the Australian Mathematical Society*  
**Character varieties**  
*Australian Postgraduate Algebra Colloquium*  
**Counting points on character varieties**  
*University of Queensland Maths Graduate Student Seminar*  
**Polynomials in the variable  $p$**   
*AMSI Summer School*  
**Character varieties in arbitrary type**  
*67th Annual Meeting of the Australian Mathematical Society*  
**Shadows of groups**  
*University of Queensland Mathematics Students Society*  
**Arithmetic, geometry & polynomials in the variable  $q$**   
*University of Queensland Maths Graduate Student Seminar*  
**Counting points on representation varieties**  
*66th Annual Meeting of the Australian Mathematical Society*  
**The representation variety and its  $E$ -polynomial**  
*AMSI Winter School 2022*  
**Hecke algebras and Gelfand pairs in representation theory**  
*Honours final talk*  
**Kinky sets**  
*University of Queensland Mathematics Students Society*  
**The twin prime and Elliot–Halberstam conjectures**  
*Undergraduate coursework*

Jan 2025  
 Sydney, Australia  
 Dec 2024  
 Auckland, New Zealand  
 Aug 2024  
 Online  
 Aug 2024  
 Brisbane, Australia  
 Jan 2024  
 Canberra, Australia  
 Dec 2023  
 Brisbane, Australia  
 August 2023  
 Brisbane, Australia  
 July 2023  
 Brisbane, Australia  
 Dec 2022  
 Sydney, Australia  
 July 2022  
 Brisbane, Australia  
 May 2021  
 Brisbane, Australia  
 Mar 2021  
 Brisbane, Australia  
 Oct 2020  
 Brisbane, Australia

## CONFERENCES, SEMINARS, WORKSHOPS, ETC.

**AMSI Summer School**  
*Course*  
**68th Annual Meeting of the Australian Mathematical Society**  
*Conference*  
**Australian AI Safety Forum 2024**  
*Forum*  
**Geometry Day @ UQ**  
*Conference*  
**AMSI Summer School**  
*Course*  
**67th Annual Meeting of the Australian Mathematical Society**  
*Conference*  
**UQ School of Mathematics and Physics Poster Day**  
*Poster day*  
**Categorified Enumerative Geometry and Representation Theory**  
*Workshop*

Jan 2025  
 Canberra, Australia  
 Dec 2024  
 Auckland, New Zealand  
 Nov 2024  
 Sydney, Australia  
 Aug 2024  
 Brisbane, Australia  
 Jan 2024  
 Canberra, Australia  
 Dec 2023  
 Brisbane, Australia  
 Oct 2023  
 Brisbane, Australia  
 Sep 2023  
 Lausanne, Switzerland

<b>UQ Flag Varieties Seminar</b>	Jun - Aug 2023
<i>Seminar</i>	Brisbane, Australia
<b>Differential Geometry Days @ UQ</b>	Feb 2023
<i>Conference</i>	Brisbane, Australia
<b>66th Annual Meeting of the Australian Mathematical Society</b>	Dec 2022
<i>Conference</i>	Sydney, Australia
<b>Number Theory Down Under 10</b>	Sep 2022
<i>Conference</i>	Brisbane, Australia
<b>AMSI Winter School: New Directions in Representation Theory</b>	Jun 2022
<i>Course</i>	Brisbane, Australia
<b>Character Varieties, E-Polynomials and Representation Zeta Functions</b>	Feb 2022
<i>Workshop</i>	Online
<b>Stradbroke Island Workshop on Character Varieties</b>	Dec 2021
<i>Workshop</i>	Brisbane, Australia
<b>Heron Island Workshop on Geometry and Representation Theory</b>	Jun 2021
<i>Workshop</i>	Gladstone, Australia
<b>Stradbroke Island Workshop on Representation Theory</b>	Feb 2021
<i>Workshop</i>	Brisbane, Australia
<b>UQ 'What is...?' (Wise) Seminar</b>	2021 - 2022
<i>Seminar</i>	Online
<b>AMSI Summer School on Stochastic Modelling</b>	Jan 2021
<i>Course</i>	Online