

NICHOLAS WILLIAMS

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EDUCATION

Doctorate in Mathematics

University of Cologne
Started at University of Leicester
Supervisor: Sibylle Schroll
Summa cum laude

September 2018 – May 2022

April 2021 – May 2022

September 2018 – April 2021

Graduate Diploma in Quantitative Economics

Birkbeck, University of London
Distinction

October 2017 – June 2018

MMathPhil in Mathematics & Philosophy

Worcester College, Oxford
Double First Class Honours

October 2012 – June 2016

EMPLOYMENT

Postdoctoral Research Associate

Lancaster University
With David Pauksztello

September 2022 – March 2025

JSPS Short Term Postdoctoral Research Fellow

University of Tokyo
With Osamu Iyama

May 2022 – August 2022

Graduate Teaching Assistant

King's College London

September 2021 – December 2021

Guest Teacher

London School of Economics

September 2021 – December 2021

Feedback Session Leader

University of Leicester

January 2019 – December 2020

JOURNAL PUBLICATIONS

- | | |
|---|------------------|
| 7. A survey of congruences and quotients of partially ordered sets
<i>EMS Surveys in Mathematical Sciences</i> | <i>To appear</i> |
| 6. The two higher Stasheff–Tamari orders are equal
<i>Journal of the European Mathematical Society</i> | <i>To appear</i> |
| 5. Stability spaces of string and band modules
With Sibylle Schroll, Aran Tattar, Hipolito Treffinger, and Yadira Valdivieso
<i>Journal of Pure and Applied Algebra</i> , Volume 228, no. 4, 107503 | <i>2024</i> |
| 4. Quiver combinatorics and triangulations of cyclic polytopes
<i>Algebraic Combinatorics</i> , Volume 6, no. 3, pp. 639–60 | <i>2023</i> |
| 3. The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders
<i>Electronic Journal of Combinatorics</i> , Volume 30, no. 1, P1.29 | <i>2023</i> |
| 2. New interpretations of the higher Stasheff–Tamari orders
<i>Advances in Mathematics</i> , Volume 407, 108552 | <i>2022</i> |

1. The combinatorics of tensor products of higher Auslander algebras of type A 2021
 With Jordan McMahon
Glasgow Mathematical Journal, 63(3), pp. 526–546

CONFERENCE PROCEEDINGS

4. The higher Stasheff–Tamari orders in representation theory 2023
Representations of Algebras and Related Structures
3. Studying triangulations of even-dimensional cyclic polytopes via directed graphs 2023
Proceedings of the 35th International Conference on Formal Power Series and Algebraic Combinatorics, Séminaire Lotharingien de Combinatoire 89B, Art. 4
2. Triangulations of cyclic polytopes and the higher Auslander algebras of type A 2022
Various issues on representation theory and related topics
RIMS Kōkyūroku No.2234
1. The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders 2021
Proceedings of the 33rd International Conference on Formal Power Series and Algebraic Combinatorics, Séminaire Lotharingien de Combinatoire 85B, Art. 6

OTHER PUBLICATIONS

2. Microthesis: Triangulations of cyclic polytopes in representation theory 2022
London Mathematical Society Newsletter, No. 501, 33–34
1. Higher-dimensional combinatorics in representation theory 2022
 Doctoral thesis, University of Cologne

PREPRINTS

5. Donaldson–Thomas invariants for the Bridgeland–Smith correspondence 2024
 With Omar Kidwai
[arXiv:2401.10093](https://arxiv.org/abs/2401.10093)
4. Steenrod operations via higher Bruhat orders 2023
 With Guillaume Laplante-Anfossi
[arXiv:2309.16481](https://arxiv.org/abs/2309.16481)
3. A geometric perspective on the τ -cluster morphism category 2023
 With Sibylle Schroll, Aran Tattar, and Hipolito Treffinger
[arXiv:2302.12217](https://arxiv.org/abs/2302.12217)
2. A structural view of maximal green sequences 2023
 With Mikhail Gorsky
[arXiv:2301.08681](https://arxiv.org/abs/2301.08681)
1. Triangulations of prisms and preprojective algebras of type A 2022
 With Osamu Iyama
[arXiv:2208.12957](https://arxiv.org/abs/2208.12957)

PRIZES AND SCHOLARSHIPS

- Gibbs prize for Mathematics & Philosophy** 2016
 University of Oxford
 For top performance in Mathematics papers
- Gibbs prize for Mathematics & Philosophy** 2015
 University of Oxford
 For top performance in Mathematics papers

Academic scholarship
Worcester College, Oxford

2013

Honorary scholarship
Westminster School

2007

INVITED CONFERENCE TALKS (IN PERSON)

Triangulations of cyclic polytopes through the lens of reconfiguration *August 2023*
Minisymposium on Combinatorial Reconfiguration
International Congress on Industrial and Applied Mathematics
Waseda University, Tokyo

A structural view of maximal green sequences *June 2023*
Cluster structures in the North
University of Central Lancashire

A structural approach to maximal green sequences *September 2022*
Silting theory, algebras and representations
Charles University, Prague

INVITED CONFERENCE TALKS (VIRTUAL)

An algebraic interpretation of the higher Stasheff–Tamari orders *November 2020*
International Conference on Representations of Algebras
Selected to give talk by scientific committee based on research snapshot

CONTRIBUTED CONFERENCE TALKS (IN PERSON)

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence *January 2024*
Cluster Algebras and Its Applications
Mathematisches Forschungsinstitut Oberwolfach

Triangulations of prisms and preprojective algebras of type A *July 2023*
Combinatorial representation theory in Leeds
University of Leeds

A structural view of maximal green sequences *April 2023*
Maurice Auslander Distinguished Lectures and International Conference

Cyclic polytopes and representation theory *December 2022*
Representation theory of algebras session
Canadian Mathematical Society Winter Meeting, Toronto

Algebraic interpretation of the higher Stasheff–Tamari orders *July 2022*
Various issues on representation theory and related topics
Research Institute for Mathematical Sciences, Kyoto University

Higher analogues of Grassmannian clusters *April 2019*
Maurice Auslander Distinguished Lectures and International Conference

Higher analogues of Grassmannian clusters *April 2019*
New Connections and Directions in Representation Theory
University of Leeds

Higher analogues of Grassmannian clusters *April 2019*
Tropical Geometry meets Representation Theory
University of Leicester

CONTRIBUTED CONFERENCE TALKS (VIRTUAL)

The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders

Formal Power Series and Algebraic Combinatorics

Bar-Ilan University

January 2022

SEMINAR TALKS (IN PERSON)

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence

October 2023

Sheffield Geometry and Physics seminar

University of Sheffield

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence

October 2023

EGRET seminar

University of Edinburgh

Donaldson–Thomas theory of quivers with potential

September 2023

Exact Asymptotics Theoretical Sciences Visiting Program

Okinawa Institute of Science and Technology

Higher-dimensional cluster combinatorics and representation theory

August 2023

OIST Representation Theory Seminar

Okinawa Institute of Science and Technology

Combinatorics of KP solitons

August 2023

Exact Asymptotics Theoretical Sciences Visiting Program

Okinawa Institute of Science and Technology

A structural view of maximal green sequences

February 2023

Algebra Group Seminar

University of Cologne

The higher Stasheff–Tamari orders on triangulations of cyclic polytopes

November 2022

Séminaire du LaCIM

Université du Québec à Montréal

Cyclic polytopes and representation theory

November 2022

Geometry and Mathematical Physics Seminar

University of Birmingham

Cyclic polytopes and representation theory

October 2022

Pure Mathematics Seminar

Lancaster University

Mutation in higher cluster categories

October 2022

Seminar@Aarhus

Aarhus University

Equivalence of maximal green sequences

April 2022

Working Seminar in Algebra and Geometry

University of Cologne

Equivalence of maximal green sequences

February 2022

Paris Algebra Seminar

Institut de Mathématiques de Jussieu-Paris Rive Gauche

An algebraic interpretation of the higher Stasheff–Tamari orders

November 2019

Pure Mathematics Seminar

University of East Anglia

SEMINAR TALKS (VIRTUAL)

Cyclic polytopes and higher Auslander–Reiten theory III*July 2022*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

Cyclic polytopes and higher Auslander–Reiten theory II*June 2022*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

Mutating cluster-tilting objects in $(d + 2)$ -angulated cluster categories*June 2022*

FD seminar

Cyclic polytopes and higher Auslander–Reiten theory I*June 2022*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

An algebraic interpretation of the higher Stasheff–Tamari orders*January 2022*

Aachen–Bochum–Cologne Darstellungstheorie Seminar

RWTH Aachen University, Ruhr-University Bochum, and University of Cologne

Cyclic polytopes and higher Auslander–Reiten theory*December 2021*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

The two higher Stasheff–Tamari orders are equal*May 2021*

Working seminar in algebra and geometry

University of Cologne

The higher Stasheff–Tamari orders in representation theory*April 2021*

Paris algebra seminar

Institut de Mathématiques de Jussieu-Paris Rive Gauche

New interpretations of the higher Stasheff–Tamari orders*March 2021*

Diskrete Mathematik / Geometrie Forschungsseminar

TU Berlin

POSTERS

**Studying triangulations of even-dimensional cyclic polytopes
via directed graphs***July 2023**Formal Power Series and Algebraic Combinatorics*

University of California, Davis

An algebraic interpretation of the higher Stasheff–Tamari orders*June 2021**Young Researchers in Mathematics*

Online

Winner of 1st prize in poster competition**An algebraic interpretation of the higher Stasheff–Tamari orders***May 2021**Advances in Representation Theory of Algebras*

Online

New interpretations of the higher Stasheff–Tamari orders*January 2021**Combinatorial algebra meets algebraic combinatorics*

Université du Québec à Montréal

Online

An algebraic interpretation of the higher Stasheff–Tamari orders*November 2020**International Conference on Representations of Algebras*

“Research snapshot”

Online

New interpretations of the higher Stasheff–Tamari orders*September 2020**Virtual Heidelberg Laureate Forum*

Online

Representation theory and Grassmannians*March 2019**STEM for Britain*

Poster competition at UK Parliament

GRANTS AND AWARDS

London Mathematical Society Scheme 1

October 2023

Conference grants

Silting, simple-minded, and stability

Co-organised with Raquel Coelho Simões and David Pauksztello

GBP 4,000

Japan Society for the Promotion of Science

December 2021

Short Term Postdoctoral Research Fellowship

JPY 5,384,000

12 months awarded but 3 months taken

London Mathematical Society Scheme 8

April 2020

Postgraduate research conference grants

Categorifications in Representation Theory

Co-organised with Aran Tattar

GBP 2,500

ORGANISATION

Silting, simple-mindedness, and stability*July 2024*

Co-organising with Raquel Coelho Simões and David Pauksztello

Ambleside Campus, University of Cumbria

Köln Algebra and Representation Theory seminar*April 2021 – May 2022*

Co-organised with Daniel Schaefer

University of Cologne

Online

Categorifications in Representation Theory*September 2020*

Co-organised with Aran Tattar

Online

Mathematics PhD seminar*September 2019 – August 2020*

University of Leicester

**Interactions between Representation Theory
and Homological Mirror Symmetry***May 2019*

Local organising committee

University of Leicester

RESEARCH STAYS

University of Copenhagen
Visiting: Guillaume Laplante-Anfossi
Host: Nathalie Wahl
1 week

January 2024

Okinawa Institute of Science and Technology
Exact Asymptotics: From Fluid Dynamics to Quantum Geometry
Theoretical Sciences Visiting Program
Invited participant
2 months

August – October 2023

Université du Québec à Montréal
Visiting: Hugh Thomas
2 weeks

November 2022

University of Aarhus
Visiting: Raphael Bennett-Tennenhaus and Amit Shah
1 week

October 2022

University of Cologne
Visiting: Sibylle Schroll and Aran Tattar
1 week

April 2021

University of Cambridge
Isaac Newton Institute for Mathematical Sciences
Cluster algebras and representation theory programme
Invited participant
1 week

December 2021

University of Graz
Visiting: Jordan McMahon
Host: Karin Baur
1 week

April 2019

REFEREEING

Communications in Algebra, Discrete Mathematics, Electronic Research Archive, Journal of Algebra, Journal of Algebraic Combinatorics

REVIEWING

AMS MathSciNet
5 reviews written

October 2022 – present

zbMATH
11 reviews written

September 2020 – present

TEACHING

Real analysis
Class teacher (online)
King's College London

September 2021 – December 2021

MA107: Quantitative methods
Class teacher
London School of Economics

September 2021 – December 2021

Calculus & analysis

Class teacher (online)

University of Leicester

*October 2020 – December 2020***Second-year algebra**

Class teacher

University of Leicester

*January 2020 – April 2020***Calculus & analysis**

Class teacher

University of Leicester

*October 2019 – April 2020***Elements of number theory**

Class teacher

University of Leicester

*October 2019 – December 2019***Calculus & analysis**

Class teacher

University of Leicester

*January 2019 – March 2019***COMMITTEE ROLES**

Mathematics & Philosophy Representative

Joint Consultative Committee with Undergraduates

University of Oxford

2015 – 2016

Undergraduate Representative

Joint Committee for Mathematics and Philosophy

University of Oxford

2015 – 2016

Undergraduate Representative

Mathematics Department Art Committee

University of Oxford

*2015 – 2016***OUTREACH**

University of Leicester Representative

Research in the UK afternoon

University of Cambridge

November 2018, 2019, 2020

Student Helper

*Oxford and Cambridge Student Conferences**March 2013, 2014, 2015***OTHER**

London Mathematical Society

Associate member

3 reports on conferences written for the LMS newsletter

*June 2019 – present***Programming**

Python, Sage, Maple, node.js, Haskell

Git

L^AT_EX**Languages**

(CEFR levels)

English Native

French B1

German B1

Japanese B1