

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 To appear
Proceedings of the 2020 International Conference on Representations of Algebras
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

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

- 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** *January 2022*
Formal Power Series and Algebraic Combinatorics
Bar-Ilan University

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
- Higher analogues of Grassmannian clusters** *April 2019*
Algebra and Number Theory Seminar
University of Graz

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

- 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
Virtual Heidelberg Laureate Forum
Online

September 2020

Representation theory and Grassmannians
STEM for Britain
Poster competition at UK Parliament

March 2019

GRANTS AND AWARDS

London Mathematical Society Scheme 1
Conference grants
Silting, simple-minded, and stability
Co-organised with Raquel Coelho Simões and David Pauksztello
GBP 4,000

October 2023

Japan Society for the Promotion of Science
Short Term Postdoctoral Research Fellowship
JPY 5,384,000
12 months awarded but 3 months taken

December 2021

London Mathematical Society Scheme 8
Postgraduate research conference grants
Categorifications in Representation Theory
Co-organised with Aran Tattar
GBP 2,500

April 2020

ORGANISATION

Silting, simple-mindedness, and stability
Co-organised with Raquel Coelho Simões and David Pauksztello
Ambleside Campus, University of Cumbria

July 2024

Köln Algebra and Representation Theory seminar
Co-organised with Daniel Schaefer
University of Cologne
Online

April 2021 – May 2022

Categorifications in Representation Theory
Co-organised with Aran Tattar
Online

September 2020

Mathematics PhD seminar
University of Leicester

September 2019 – August 2020

**Interactions between Representation Theory
and Homological Mirror Symmetry**
Local organising committee
University of Leicester

May 2019

RESEARCH STAYS

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

Max Planck Institute for Mathematics, Bonn
Visiting: Guillaume Laplante-Anfossi
1 week

February 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
4 reviews written

October 2022 – present

zbMATH
10 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*October 2019 – April 2020*

Class teacher

University of Leicester

Elements of number theory*October 2019 – December 2019*

Class teacher

University of Leicester

Calculus & analysis*January 2019 – March 2019*

Class teacher

University of Leicester

COMMITTEE ROLES

Mathematics & Philosophy Representative

2015 – 2016

Joint Consultative Committee with Undergraduates

University of Oxford

Undergraduate Representative

2015 – 2016

Joint Committee for Mathematics and Philosophy

University of Oxford

Undergraduate Representative

2015 – 2016

Mathematics Department Art Committee

University of Oxford

OUTREACH

University of Leicester Representative

*November 2018, 2019, 2020**Research in the UK afternoon*

University of Cambridge

Student Helper

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

London Mathematical Society

June 2019 – present

Associate member

3 reports on conferences written for the LMS newsletter

Programming

Python, Sage, Maple, node.js, Haskell

Git

L^AT_EX**Languages**

(CEFR levels)

English Native

French B1

German B1

Japanese B1